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High Grade Manganese Ores of Brazil

The Important Deposits of Minas Geraes, Their Occurrence and Methods of Operation —Increased Shipments to the United States

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Manganese is one of the few industrially important metals that the United States does not produce in quantities commensurate with its demand and consumption. Ores of manganese are mined here in only insignificant quantity and the production is not so great now as it was in years gone by. The result is that we are forced to import annually an average of about 300,000 tons of such ores, having a value of over $2,000,000. In 1914, one-half of this ore came in through the port of Baltimore, and one-third through Philadelphia.

The European war, which has produced abnormal conditions in so many industries, has likewise affected the mining of manganese. Before the outbreak of the war, Russia was by far the largest producer of manganese ores, British India ranked second, and Brazil third; moreover, these three countries were the only important producers. While no statistics are available of the present production of Russia and India, it is known that there has been a considerable falling off in their output, particularly in the case of Russia; whereas, as we shall see presently, the output of Brazil has been rapidly increasing to meet the demand for manganese in this country.

Fig. 1.—Map Showing Position of the Brazilian Manganese Deposits with Reference to the Central Railroad of Brazil and the Minas Geraes Iron Region. The latter is included approximately in the area bounded by Bello Horizonte, Itabira, Marianna and Miguel Burnier

Up to the outbreak of the war the rank of these three countries as contributors to our imports of manganese ore was British India, Russia, Brazil, and in 1913, only one-fifth of the total came from Brazil. In 1914 the imports from Brazil exceeded those from the other two countries and amounted to two-fifths of the total; the 1915 figures give Brazil a still more prominent position, both as a producer and as a contributor to our imports, over nine-tenths of the latter having come from that country.

The manganese industry of Brazil is of comparatively recent development, and considering that it is an industry subject to all the vicissitudes of the iron industry, it has enjoyed a continuous expansion since its inception in 1894, as the table of statistics of output indicates.

Table of the Manganese Ore Production of Brazil

Year	Gross Tons	Year	Gross Tons
1894	1,430	1898	27,110
1895	5,570	1899	62,178
1896	14,710	1900	127,343
1897	14,370	1901	104,214
		1902	164,283
		1903	197,315
		1904	216,463
		1905	224,377
		1906	121,331
		1907	236,778
		1908	166,122
		1909	236,982
		1910	249,954
		1911	171,172
		1912	152,431
		1913	180,738
		1914	270,000
		1915	350,000
		Total	3,294,871

VARIETY OF THE MINAS GERAES DEPOSITS

With the exception of a small quantity that has been produced in the interior of the State of Bahia, to the west of the city of Bahia, this output has come from the State of Minas Geraes. This State, the name of which means "mines of all kinds," was indeed rightly named, as it has always been the mining region of Brazil, and it is certainly one of the most remarkable mineralized areas of the world. A circle drawn within this State with a radius of a little more than 100 miles would include a very old diamond field that has been producing steadily for over three centuries; two important gold mines, one of which with a depth of 5824 ft. enjoys the distinction of being the deepest mine in the world; the world's largest and richest iron-ore deposits, which, until one has actually seen them, pass the bounds of credulity; and the important manganese deposits that are about to be described, one of

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which has a greater tonnage of high grade ores developed than any other known manganese occurrence. During the past year, we had the opportunity of visiting all of these deposits. The manganese deposits are so little known, and yet so important and geologically interesting, that an account of them is of considerable interest.

The manganese ores of Minas Geraes are of two distinct types, occurring in separate but not far distant districts. The older district centers about Miguel-Burnier, which is a station on the Estrada da Ferra Central do Bresil, 496 km. north of Rio de Janeiro, and parallels the branch line that runs from there to the ancient mining town and former capital of the state, Ouro Preto. The other district centers about Lafayette or Queluz on the same railroad at kilometer 463. The centers of the two districts are consequently but 20 miles apart. The former lies at the southern edge of the great iron-ore region of Minas, and the latter a short distance to the south of it.

THE MIGUEL-BURNIER DISTRICT

The manganese deposits of this district extend in a narrow belt with a nearly east-west direction from the Bocaina mine, which lies about 1½ miles southwest of Burnier, to the Rodeio mine, about 8 miles east of that place; in other words, the district has a length of about 10 miles parallel to the Ouro Preto branch of the railroad. With exception of the Rodeio mine, all of the operations are now in the hands of Carlos Wigg, administrator of the Wigg estate, the owners of the properties. The Rodeio mine lies on the south side of the Ouro Preto branch and is connected with the station Metallurgica by an aerial tram. It has been operated during the past three years by the same company that owns the Morro da Mina mine under the name of Companhia Metallurgica, and has a monthly output of 1000 to 1200 tons.

Fig. 2—Sharp Contact of Manganese Ore and Country Rock, as Indicated by the White Line

Mr. Wigg told us that he started mining manganese ores in 1894 on what is known as Section 6 of the Wigg estate, and that he has the distinction of being the first person to work manganese ore in Minas Geraes. The first mine, located on a hill on the north side of the railroad at Uzina station, 3 km. east of Burnier, was worked continuously until about a year ago, when the opening had become so deep and so much water had to be contended with that it was finally abandoned. The present output, aggregating about 100 tons per day, comes principally from Section 9, which lies one mile east of Uzina, and is supplemented by small outputs from a number of openings between Uzina and Burnier and from the Bocaina mine.

The Burnier manganese ores occur in the Itabira iron formation which is a sedimentary series of probable Algonkian age. It is the same formation that includes the great iron-ore deposits of this part of Brazil. In the vicinity of the manganese mines, it shows a rapid succession of itabirite, schist, calcareous schist, and limestone. Most abundant is the itabirite; the limestone occurs at various horizons in the shape of lenses of limited extent, sometimes in schist, at other times intercalated between schist and itabirite, and then again wholly inclosed in itabirite. The limestone is described as dolomitis and manganiferous.

There is some difference of opinion as to the relations of the manganese deposits to this series of rocks. According to one view they represent replacements and residual enrichments through the agency of atmospheric waters of some of the manganiferous limestone lenses. Harder and Chamberlin, on the other hand, look upon them as syngenetic deposits laid down as a part of the sedimentary series in the same manner as the iron ores. They mention the occurrence of the carbonate rocks but state that they occur at different horizons from the manganese beds.

Our observations lead us to the conclusion that the ores do not occur at any definite horizons, but are coextentive stratigraphically with the limestone lenses, and like them are lenticular in shape. Though it cannot be stated positively that they are not of sedimentary origin, the weight of evidence is in favor of the theory that they represent replacements of the limestone lenses. At all the mines visited, the inclosing wall-rock, which is usually itabirite, has been subjected to considerable alteration under the action of descending waters, and where the schist is present it has been altered to residual clay. This alteration is most pronounced in the hanging-wall rock. It seems very likely, therefore, that the ore bodies represent replacements of carbonate rock intercalated in these strata.

At the Section 9 mine, the width of the manganese bed is from 1 to 1½ meters, and it has been developed for a length of 600 meters. At other places the width of the ore body is somewhat greater, as at the Uzina mine, where it had a maximum width of over 2 meters. The mines are usually started as open cuts, but on account of the narrowness of the ore bodies they run into depth so rapidly that underground mining must soon be substituted. The soft decomposed character of the wall-rock makes the ground exceedingly heavy and calls for considerable timbering. It will be clear from the description of the Morro da Mina mine that mining costs are considerably higher here than at Lafayette.

The ores consist for the most part of amorphous or finely crystalline compact manganese oxides, with which are associated many lumps and concretionary forms similar to those so common in the brown iron

Fig. 3—Sharp Contact of Manganese Ore and Queluzite as Shown by White Line

ores. There is also a certain amount of soft earthy material present. Psilomelane is probably the most abundant mineral and mixed with it is considerable pyrolusite. The ore is very high grade, averaging 50 per cent manganese, 1 per cent silica, and 0.03 to 0.05 per cent phosphorus.

THE QUELUZ DISTRICT

The deposits of this district began to be worked a few years after mining commenced at Burnier, and this is now by far the more important area. The first mine was that at Piquery, which lies about 15 miles to the northwest of Lafayette, but after having furnished about 250,000 tons of ore it was abandoned as worked out about ten years ago. This mine was worked by a Brazilian concern known as the Gonçalves Ramos Companhia, which also formerly worked on what is now a part of the Wigg estate. The principal mine at the present time is the Morro da Mina, located a short distance outside of Lafayette, which has increased its production to 700 tons per day. It is owned and operated by a Brazilian company known as the Companhia Morro da Mina.

A German company under the name Mineraçâo de Agua Preta has been working for six or seven years the rubble ores at the east end of the Morro da Mina ground, and with an average production of 2000 tons per month has produced a total of 200,000 tons.

On the small hill to the southeast of the Morro da Mina, the extension of that zone is being prospected by a new company known as the Companhia Queluz da Mina, but the ore thus far opened up is not of good grade. Another working mine is the Cocuruto, which lies about 25 miles southwest of Lafayette and is connected by means of a 60-cm. gage line 40 km. in length with Christiano, a station on the main line about 30 km. south of Lafayette. The operator here is a Belgian company known as the Societé Anonyme de Manganese de Ouro Preto, which about twelve years ago opened the now abandoned Son Gonçalo mine near the Piquery mine. The Cocuruto mine has been worked about seven years and produces 3000 tons monthly.

In addition to those mentioned there are a great many other mines in the district that are now idle. Orville A. Derby, the late director of the Geological Survey of Brazil, says of the district: "The mining and prospecting operations thus far effected have, on account of questions of transportation, been limited to a zone 10 to 20 kilometers wide on each side of the railroad. In the zone thus defined the outcrops of ore are so numerous and large as to indicate an extremely extensive and widespread mineralization of an area that is doubtless much larger than has thus far been recognized." This is a region worthy of attention on the part of American iron and steel manufacturers who are interested in securing their own manganese properties, as a systematic investigation of the region will almost certainly bring to light other deposits of importance.

It has already been stated that geologically these deposits are quite different from those of the Miguel-Burnier district. They occur in an area of supposed Archean rocks consisting of granites, gneisses, and schists, the latter including amphibolites. Intrusions of diroite, gabbro and pegmatite occur sparingly. The manganese ores occur as elongated masses of more or less lenticular shape within these rocks. The immediate wall-rock is everywhere so thoroughly decomposed, in many instances being nothing more than a residual clay,

Fig. 4—Southeast End of the Main Workings at the Top of the Morro da Mina Manganese Ore Mine, the Largest in Brazil

that it is rather difficult to determine its original character. It seems that all of the rocks of this Archean series have at one place or another served as wall-rock, though the gneiss has probably been the most common one. There are also horses of equally decomposed rock of the same character within the ore bodies themselves. The contact of wall-rock and ore is always quite sharp, as is shown in Fig. 2.

The ores represent surface alterations of an original manganese rock that Derby has designated queluzite. The mineralogic composition of this rock is somewhat variable, but the most common and characteristic constituents are the manganese garnet spessartite, tephroite, which is the manganese equivalent of olivine, and a greater or less quantity of manganese carbonate. Rhodonite is conspicuous locally, but on the whole occurs in small amount. Another phase of the rock consists of garnet and quartz. Where the pink color of the manganese minerals, rhodonite and rhodochrosite, does not betray the manganese content of the rock, and the garnet is not coarsely crystallized, its megascopic appearance is that of a dull grey, fine grained, impure limestone.

At many places the entire outcrop of the rock has been altered to ore, so that it is first encountered in depth. The amount of alteration and the depth to which it extends seem to depend greatly on the nature of the queluzite, where the quantity of spessartite is greatest the rock has succumbed least to alteration, where as the maximum alteration is encountered where the most carbonate was present. In its broader features, the contact between ore and queluzite is sharp, as illustrated in Fig. 3, but in detail there is a narrow zone of transition in which tongues and branching stringers of the manganese oxides penetrate into the queluzite.

There is considerable doubt as to the exact nature of the queluzite. It occurs as irregular elongated masses of variable but restricted extent intercalated in the gneisses and schists. Two theories have been advanced to explain its origin. Some look upon it as the igneous intrusion that has been injected into those rocks. Hussak, on the other hand, regards the queluzite as derived from layers of manganese carbonate intercalated in them, which have been subjected to contact metamorphism by the granite intrusions in their neighborhood. The abundance of carbonate in it would make the explanation of its derivation from an original carbonate rock the more plausible.

The appearance of the ore is quite similar to that of the Burnier district. Hard ore, which is probably psilomelane, is most common, but the softer earthy oxides occur abundantly intermixed with it. Botryoidal and mamillary forms are abundant and afford most magnificent specimens. The manganese content of shipments ranges from 48 to 52 per cent, phosphorus averages 0.07 to 0.09 per cent, which is about double that of the Burnier ores, and silica is also somewhat higher than in the latter, averaging around 2 per cent. No complete analyses of the ores are now made, but the average analysis of those shipped from the Morro da Mina mine about ten years ago is as follows:

	Per Cent	
Water at 100 deg. C	2.50	
Volatile matter	12.40	chiefly oxygen
Insoluble residue	3.46	
Silica	1.76	
Fe_2O_3-Al_2O_3	8.75	alumina, about twice ferric content
Phosphorus	0.069	
Sulphur	None	
Metallic manganese	50.47	

These data show that the ores are of very high grade.

THE MORRO DA MINA MINE THE LARGEST

This deposit is by far the largest manganese occurrence yet discovered in Brazil. The 1915 production amounted to 200,000 tons, and it has produced a total of over 1,000,000 tons. Development work has proved a reserve of 10,000,000 tons, which J. deA. Lustosa, the manager of the mine, says makes this the largest deposit of high grade manganese ore in the world. The mine is situated on a hill known as the Morro da Mina about 7 km. northeast of the station of Lafayette with which it is connected by a branch railroad line, so that the ore can be loaded into the cars at the mine and requires no further handling until transferred to the boats for exportation.

The Morro da Mina is a hill that has an elevation of 1110 meters above sea level and which rises to a height of 200 meters above the surrounding country. The ore bodies occur at the top and on the flanks of the hill as a series of lenses extending in a direction 13 deg. W., with a vertical dip and a pitch of 45 deg. to the southeast. The principal ore-bearing area has a length of 800 m. and a width of 300 m., within which there are four important lenses overlapping in such a way that each successive lens toward the southeast lies on the northeast side of the preceding. The horizontal dimensions of the lenses from northwest to southeast are 150 m. x 50 m., 400 m. x 100 m., 120 m. x 30 m., and 100 m. x 15 m. The ores have been encountered in a development tunnel which cuts the second and third ore bodies just mentioned at a depth of 130 m. below the summit of the hill, indicating that they extend at least to this depth. In addition to the ores in situ, there is a large tonnage of rubble ores on the slopes of the hill.

Most of the mining is by open-cut methods and is done by hand. Fig. 4 shows the southeast end of the main workings at the top of the hill. Although mining costs are low, it would seem that with the magnitude that the operations have now attained they could be still further reduced through the use of steam shovels. Of the present output two-thirds comes from the ore in place and one-third from rubble ore and the screening of an old dump. All of the ore is screened over a 2 cm. screen and only the oversize is shipped. The undersize, constituting about 15 per cent of the product, contains 35 per cent manganese and is being stored on a separate dump to be subjected to washing or other beneficiation at some future time.

MINING AND SHIPPING COSTS

In 1914 mining costs had been reduced to 60c. per ton, and with the increased production of 1915 were doubtless still lower in that year. The freight rate to Rio de Janeiro is $1.50 per ton. Before the war, freight rates from Rio de Janeiro to Europe or the United States were $3 to $3.50 per ton, but have now increased to $7.50 to Europe. Exports to Europe have practically ceased so that nearly all of the ore is now coming to this country, and is carried principally in sailing vessels at the rate of $5 per ton.

There are 500 men employed at the mine, and the company is showing a commendable spirit in caring for them. On the north slope of the hill a miners' camp has been constructed for them, consisting of a number of simple but attractive houses, which are rented at 75c. to $2.50 per month, this rental representing 10 per cent on the cost of construction.

Production of 8-In. and 9.2-In. Shells

Machines Required and Methods Used—How the Shells Are Tested—Interchangeable Parts in the Design of American Shells

BY C. A. TUPPER*

In connection with the plans of preparedness for defense which are now agitating the nation, particular importance attaches to the production of shells of calibers from 6 in. to 10 in., which are the largest ordinarily used along the mobile front. Lessons drawn from the European war have demonstrated, first, the difficulty of providing facilities on short notice for the manufacture of heavy shells, and, second, the possibility of planning the work in such a way as to permit the use of practically the same equipment in turning out shells of different sizes within a reasonable range. Certain features of interchangeability, as in the use of fuses, can also be introduced.

A very good example of co-ordination in design and production is afforded by the British 8-in. and 9.2-in. shells illustrated in this article. Furthermore, it will be appreciated that in the manufacture of projectiles of such sizes, as compared with smaller calibers, very considerable modifications are brought about by the increased diameters, lengths, capacities and weights, and also by the greater stresses set up in the material all along the line, from forging and machining to the discharge of the shells from field pieces under actual service conditions.

The drawings are the outline working drawings of high-explosive shells for 8-in. and 9.2-in. howitzers. On firing tests, as completed, these are each required to stand a charge which will give a chamber pressure of not less than 26,000 to 27,000 lb. per square inch, which conveys some idea of the materials and care needed in their production.

Open-hearth steel is commonly used for the body of the shell, and the original British specifications for these calibers provided exclusively for that made by the acid process. Requirements as to the forging billet are in general the same as those previously described for 6-in. shells, except as stated farther along.

Forging equipment which can be used for both sizes will include one or more units consisting of, say, a 1500-ton vertical piercing press, a 1000-ton vertical or horizontal drawing press, a large accumulator and the necessary pumps, surge tanks, operating valves and high-pressure piping—all designed for a working pressure of 3000 lb.

MACHINING THE 8-IN. SHELL

After the forging has been delivered to the machine shop it is handled on very much the same lines as the smaller high-explosive shells heretofore described in THE IRON AGE. The first essential operation, apart from work to facilitate the setting and handling, is roughing off the base. Then, in the case of the 8-in. shell, gaging to approximately 23.5 in. (for a finished length based on 2.9 calibers but not exceeding 23.39 in.), the open end of the forging is trimmed. Roughing and finishing cuts on the exterior of the body leave a diameter for the cylindrical section of 7.955 in., with only 0.01 in. tolerance, against a length of 23.2 in. from the finished base edge, with 0.19 in. tolerance. The nose, which should be formed to approximate closely the contour in the drawing press, is machined so that it tapers from the diameter of the body cylinder to a maximum of 2.412 in. or minimum of 2.392 in. at the open end. The contour of the head, which must be concentric within 0.0375 in. of the true longitudinal axis of the body, is formed on a radius of 15.91 in., as shown by the drawing. This, it will be noted, is the equivalent of two calibers.

One lathe, with turret tool blocks, will do all of the body turning on a single shell in something under an hour.

Rough and finish boring of the interior requires a powerful horizontal drill of the lathe type, using either single point tools governed by a former or else formed tools. With sufficiently skilled tool makers and machinists, the latter are preferable. For these operations 1½ to 2 hr. must be allowed, depending upon the exact conditions of service. Finish boring brings the interior diameter of the cylindrical section to approximately 5.25 in., with tolerances governed by the finished outside diameter and by a maximum wall thickness of 1.37 in. or minimum of 1.32 in. From the bore mentioned the interior tapers on an arc radius of 18.05 in. to exactly 2.5 in. at the junction of the removable nose piece (or to 1.9 in. if the alternative integral threaded head is used). The total chamber capacity should approximate 362 cu. in.

Facing the nose and boring, reaming and tapping the throat to the dimensions indicated by the drawings are operations which naturally vary according to the design of the head used, but they can best be performed on special machines, similar to those previously mentioned for the work on lighter shells. If the specifications call for the removable nose bush, this will, of course, be separately produced, preferably in manufacturing automatic machines. At the junction of the shell with the nose bush all sharp edges must be removed.

With either type of head, however, only one tommy hole has to be drilled and tapped and only one set screw provided for, as contrasted with the two set screws for the 6-in. shell previously described. This screw has a body diameter of ¼ in. and a right-hand thread cut on the scale of 20 to the inch. The low position of the driving band, which is placed 0.8 to 1 in. above the base line, and the exceptional design of the hollowed out plug or "base plate" will be noted from the drawing. Depth of the recess to 3.92 in., with maxima and minima of the threaded and solid sections as shown, also indicates the degree of protection given against possible defects in the metal of the shell forging at the base from piping or other causes. A separate drop or power forging with the grain of the metal lying across that in the wall of the shell, is used for the base plate. Machining and threading of the latter can be economically done in an automatic machine. The bottom of the base plate, exactly 6 in. in diameter, is broached for a ¼ in. centering indent and two ¾ in. holes for the screwing in pins are drilled on a radius of 1.925 in. from the center. The top of the base plate has an outside diameter just sufficient, or about 0.1 in.

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less than that of the cylindrical interior of the shell, to insure a close fit. After the base plate has been cemented and screwed in, it is faced off smooth and the edge radius chamfered.

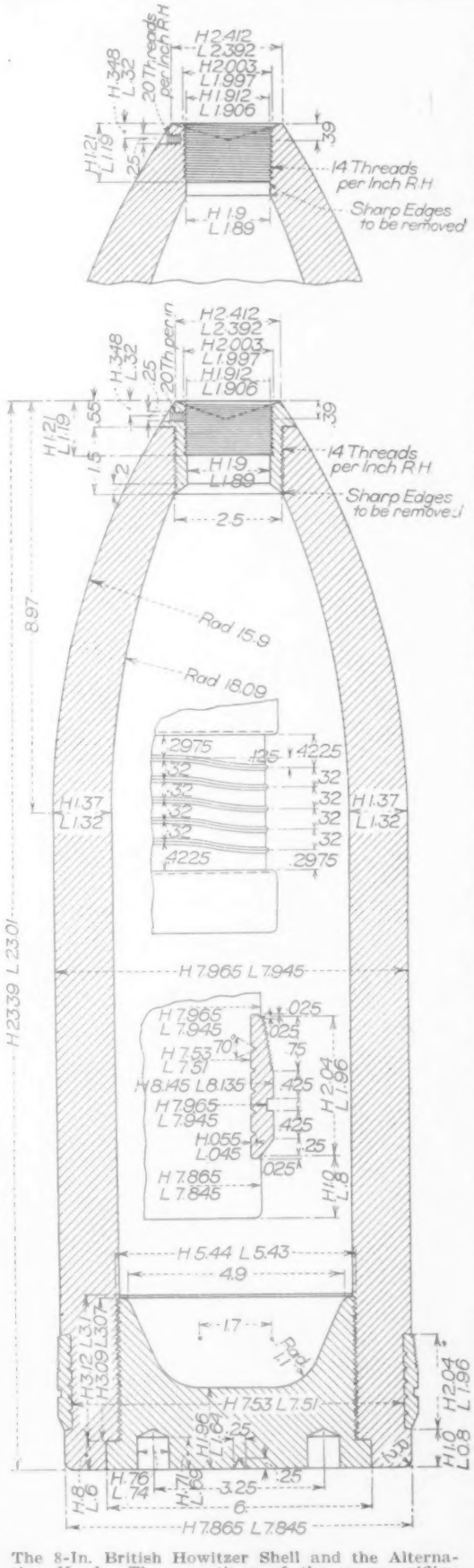
Cutting the band seat to a width of 2 in. (0.04 in. either way), and undercutting and waving are operations which can be performed on a lathe at one setting, with the aid of the waving attachment now familiar to munitions manufacturers and to readers of THE IRON AGE generally from previous descriptions. The details show in section the design of the band seat, with the five ribs, each of which, cut on a 70-deg. angle, is given eight waves. Three chisel cuts are made across the waves, as usual, to permit escape of air when the copper band is being forced into place. The copper band is cut from tubing, pressed or swaged on and turned as indicated in the details. A mean windage over the body of 0.045 in. is allowed for on each 8-in. or 9.2-in. shell. The maximum thickness of the copper on the former is 0.62 in., and it projects out 1.85 in. beyond the steel wall of the shell. Serrations are made 0.032 in. deep, 20 to the inch, over the upper section of 0.75 in.

Table No. 1—Weights of 8-In. Howitzer Shell

	Lb.	Oz.	
Empty body, steel	173	0.5	
Driving band, copper	4	0	
Total empty, unpainted	177	0.5	Permissible Overweight, 1 oz. Underweight, 1 lb., 12 oz.
Paint	..	2.0	
Bursting charge	20	0.0	
Fuse No. 100, with gaine	2	13.5	
Total filled	200	0	Plus or minus 3.25 oz.

THE 9.2-IN. SHELL

Having the above in mind for the 8-in. shell, it is easy to figure out the work necessary for the larger projectile. This 9.2-in. shell, apart from its larger dimensions, capacity and weight, differs from the 8-in. design chiefly in the shape of the base plate and in its relatively greater capacity for explosive. In body caliber the shell is 9.155 in., plus or minus 0.01 in., and it has a length based on 2.91 calibers, which works out in practice as a minimum of 26.63 in. and a maximum of 27.07 in. The thickness of the side walls, being practically identical with that of the 8-in. shell, allows for a relatively larger bore, so that the total chamber capacity is 614 cu. in., as compared with 362 cu. in. for the 8-in. shell. From a main diameter of 6.5 in., plus or minus 0.01 in., the shell interior tapers to 2.5 in. at the opening to the throat, which is the same as the corresponding measurement of the 8-in. shell. It will also be observed that while the dimensions of the nose and the length of the fuse bush necessarily exceed those of the 8-in. size, the shoulder of the fuse bush and the interior threaded part are identical with the corresponding section of the bush used on the 8-in. shell. *Thus the fuses for the 8-in. and 9.2-in. shells are interchangeable. This is a feature of great importance, and one that could just as well be carried out for other calibers which can be grouped for purposes of manufacture and field service. Its application to American conditions for 7 to 10-in. calibers should not be lost sight of in the plans for our national defense.* The fuse specified for both of these shells is the British No. 100. The fuse bush was originally made only of brass (Class C metal), but mild steel can now be used. Only a single tommy hole and set screw are required for the 9.2-in. shell, the same as for the 8-in.



The 8-In. British Howitzer Shell and the Alternative Head. The serrations of the copper rifling band, shown in detail, are of 0.05 in. pitch and 0.032 in. deep

The base plate of the 9.2-in. shell has a diameter of approximately 7 in. and a depth of 3.4 in., with 0.1 in. tolerance. Left-hand threads, 8 to the inch, are cut for holding this plate in. On its upper surface the base plate is machined, as usual, to a diameter which will give it a snug fit, assumed to be 0.01 in. within that of the shell interior. In the bottom the holes for the screwing-in pins are drilled on exactly the same centers as for the 8-in. shell.

In cutting the band seat, seven ribs are made, with nine waves each as illustrated. Copper is then pressed in and given the profile shown. A feature differing from the 8-in. shells or those of smaller calibers is the projecting lower serrated section of the band, which gives an overall diameter at this point of 9.61 in., plus or minus 0.01 in., as compared with only 9.155 to 9.165 in. for the steel cylinder of the body.

Figures of weights for

Table No. 2—Weights of 9.2-In. Howitzer Shell

	Lb.	Oz.	
Empty body, steel	244	7	
Driving band, copper	8	4	
	252	11	Permissible overweight, 10 oz.
			No underweight allowed.
Paint		2	
Bursting charge	34	5.5	
Fuse No. 100, with gaine	2	13.5	
	290	0	Plus or minus 4 oz., 10 dr.

the 8-in. and 9.2-in. shells, as completed, are given in the accompanying tables.

TESTING THE SHELLS

Testing of 8-in. and 9.2-in. projectiles proceeds along identical lines, and it may be taken as a criterion for all heavy high-explosive field shells for calibers of 12 in. and under. Armor piercing projectiles are, of course, in an entirely different class.

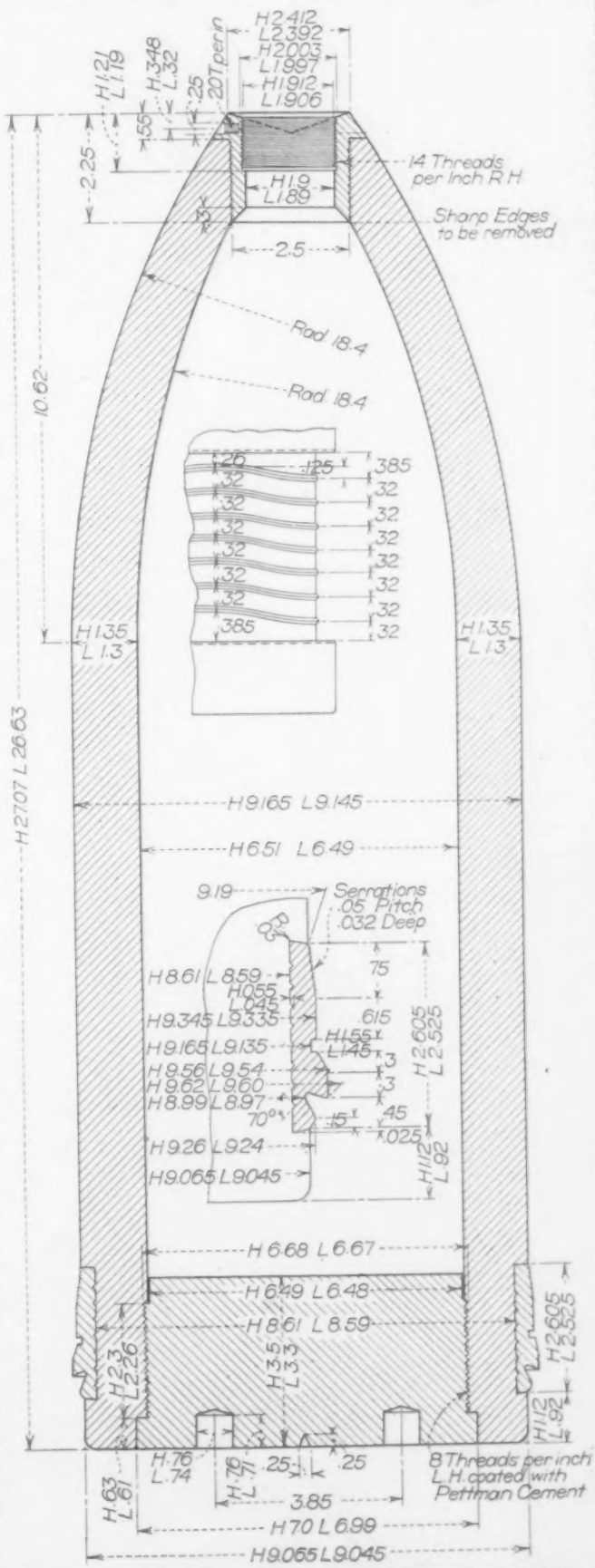
Before final acceptance of each lot, a certain number of shells, filled with sand or other suitable material, are required to be discharged from a field gun on proving grounds where they can be recovered. The 8-in. shell shown is liable to "set up" with a chamber pressure calculated at 35,600 lb., and the 9.2-in. shell at 2400 lb. less. A uniform test pressure of 26,000 lb. has been fixed for both, and this must not be exceeded by more than 1000 lb.

With the firing conditions properly complied with by the artillery authorities making the test, specifications provide that "should the shells so fired set up or break up in the gun, or should the base plate be found to have shifted or to have been incorrectly fitted, or should any portion of the driving band separate from the shell before the first graze or impact, the lot will be rejected." In case, however, it develops that the maximum chamber pressure of 27,000 lb. allowed for was exceeded, a second proof is to be made, without expense to the manufacturer, before the lot is rejected. The pressure of this round, if not taken, will be assumed to be that of the last round fired with the same charge in which pressure was taken.

Field observation is made of the flight of the shell. If reported unsteady and found, on recovery, to be without its driving band or that the band has slipped or is loose on its seat, "then," say the instructions to inspectors, "the driving bands of a similar number of shells to those taken for firing proof may be cut out to ascertain whether they have been properly pressed down." If not, they are to be rejected. A lot once condemned, however, cannot be resubmitted unless the rejection was due wholly to the failure of the driving band or to rectifiable gaging defects. Such shells must also be given a small rejection mark, so that they can be readily identified when again tendered on the contract.

From the emphasis placed here upon the driving band, it must not be inferred that tests of it are merely confined to the firing proof and the action subsequently taken. Immediately after the bands of a given lot have been pressed on their seats, one or more selected at random are cut off and subjected to both physical and chemical tests. These include doubling and hammering to see whether any break or crack results.

Inspection of the shell and fuse base is, in general, much more rigid and comprehensive than for any of smaller caliber. This begins with the method of steel making, as stated above, and includes requirements for the pouring of ingots as outlined in the article on 6-in. shells printed in THE IRON AGE of Jan. 6, 1916. If only one shell is to be made from an ingot, as would naturally occur more frequently abroad because of the small molds used, the ingot, after removal of the discard, must be stamped so as to insure the coincidence of the



The 9.2-In. British Howitzer Shell. The markings of the base for this and 8-in. shells are similar to those for 6-in. shells, already illustrated in these pages

base of the shell with the bottom of the ingot. Markings which will show the ingot cast number are retained on each shell throughout the process of manufacture.

Basic specifications issued by the British war department, which have been changed in this country as circumstances dictated, provide for a chemical analysis of the steel, apart from its iron, as follows:

Percentage of Elements in Shell Steel

Carbon	0.55	Sulphur	0.05
Nickel	0.50	Phosphorus	0.05
Silicon	0.30	Copper	0.10
Manganese	0.40 to 1.00		

Any modification of those, including the introduction of additional hardening or toughening elements like chromium, vanadium, etc., must also be strictly a matter of agreement; but where permissible variations occur, trouble may be avoided by calling the inspector's attention to them promptly as analyses are reported by the works chemist.

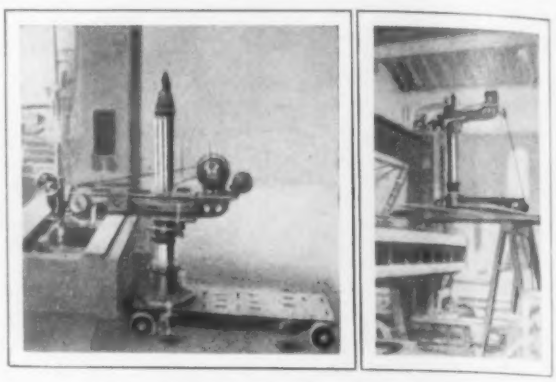
Longitudinal tensile and compression tests are made on pieces cut from the walls of at least 1 per cent of the shells made from every pouring, and two pieces for the same purpose are cut from the finished base plate at right angles to each other. An elastic limit of 38,000 lb. and tensile strength of 70,000 to 98,000 lb. are the minima that will pass inspection. Elongation of 17 per cent in 2 in. is required for the shell body and at least 12 per cent for the base plate. Furthermore, a cylindrical section having a length equal to its diameter must stand compression to half that length without cracking.

If a fuse bush made of brass (class C metal) is used, tests are made on pieces not less than 7 in. in length nor under 1 in. in diameter, with an elastic limit above 12,000 lb. and tensile strength of 24,000 lb. or more. Elongation required is 10 per cent in 2 in. Not more than 0.1 per cent of lead is permissible, and where the nose bush is liable to come in contact with the explosive it must be well nickel-plated or coated with "pure" tin. Such purity, however, seems to be open to doubt, for official specifications provide that "the pure tin or nickel used for coating must not contain more than 0.1 per cent of lead," and the coating is to be continuous and satisfactory as regards adhesion in the opinion of the inspector.

The bodies and bushes must, of course, be suitably protected by varnishing the interior, luting, painting and coating; and the usual directions as to marking, packing, shipping, etc., are required to be strictly followed. These, however, have been so fully given in THE IRON AGE in connection with shells of other calibers that no repetition is necessary here. One specific case is the article on 6-in. shells in the issue of Jan. 6.

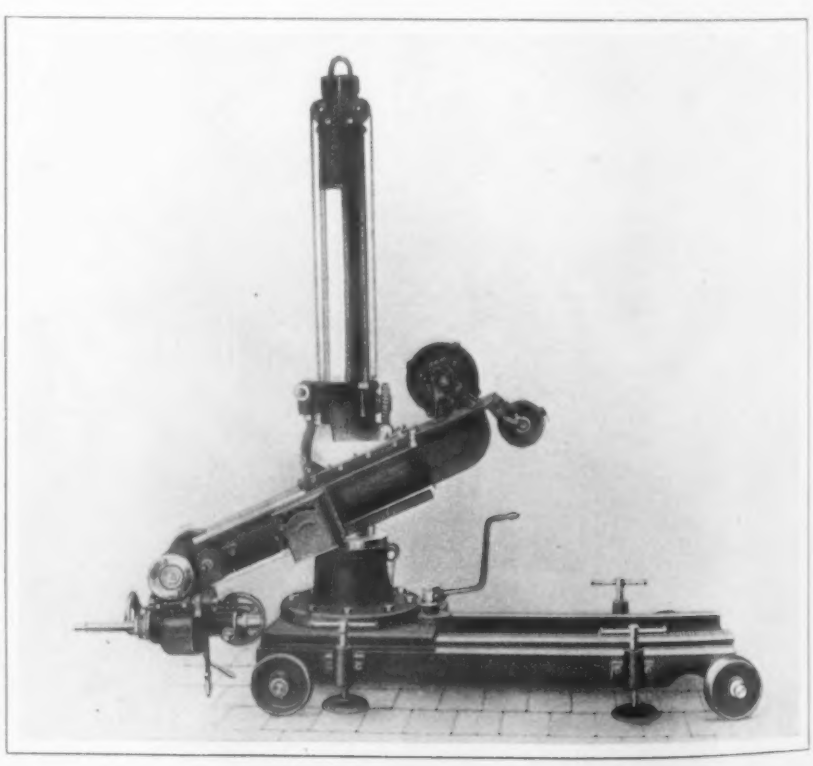
A Portable Radial Drilling Machine

The Wiener Machinery Company, 50 Church Street, New York City, is introducing into this country a portable radial drilling machine known as the C & E. It is designed primarily for drilling, tapping and reaming holes in large, heavy and bulky pieces that cannot be brought to a radial drilling machine of the ordinary type, and also as a substitute for the so-called clamp drilling machines employed for drilling and tapping an assembled machine. Some of the ways in which this machine can be used in the shop are brought out in the accompanying illustrations. It will be noticed that in one of these the machine is supported partly by scaffolding and in part by the machine upon which it is working. If desired the machine can be used on pieces fastened to its base.



Some of the Possibilities of the Machine

In addition to the plain type of base shown, a base is made having a number of slots for clamping work. The arrangement provided to prevent movement of the machine while it is at work is also brought out in the cut. This device consists of four screw jacks which rest on the floor and enable the machine to be elevated slightly to bring the wheels clear of the floor.



A Portable Radial Drilling Machine That Can Be Used in Almost Any Position and Is Equipped with a Table for Clamping Work and Jacks to Prevent Movement While at Work

Multiple Filter and Grease Extractor

As a substitute for filter beds requiring a comparatively large amount of space, the Lagonda Mfg. Company, Springfield, Ohio, has placed on the market a feed water filter and grease extractor. In general construction the filter is the same as that illustrated in THE IRON AGE, Oct. 31, 1912, with the exception of a davit arrangement for removing the cover and the filtering spool, and, of course, the addition of the grease extracting portion. It is arranged for location between the boilers and

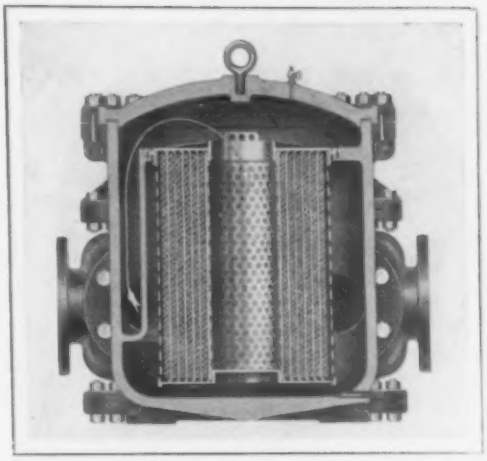
The Special Machine Employed for Winding the Linen and the Flexible Wire Spacing Mat on the Filter Spool

pumps, the filtering section being intended to remove the finely divided solids contained in the feed water, which consists, in part, of the hot condensate returns from the condenser and the heating systems, while the grease extractor, as the name indicates, is relied upon to remove the oil and greases carried over from the main engine cylinders and auxiliaries by the exhaust returns.

The filter is a double unit machine, each section of which, it is emphasized, is capable of furnishing the rated capacity. Double control valves serve to connect the two filters into a self-contained unit, and in ordinary operation one chamber is in service while the other is held in reserve until such time as it becomes necessary to change the spool. This arrangement is planned to eliminate interruption in the supply of filtered water and to put both chambers in service in parallel should an excessive demand arise.

The filtering medium consists of a large perforated metal spool similar to the strainer baskets used in the earlier type to remove the trash. Around this spool is wound a long strip of Terry linen in several layers, with a flexible wire mat to give the desired separation between the successive layers. The water enters the filter at the left, passes into the filter chamber at the top, and flowing down through the perforated core of the spool filters out in all directions through the linen into the chamber surrounding it, and finally flows off through the outlet at the right. The large diameter and length of the spool are calculated to give an effective filtering area and maximum capacity of each layer without introducing a great amount of resistance to the flow.

Under ordinary conditions the filter cloth is not to be removed and cleansed oftener than once in ten or fifteen days, the necessity for cleaning being indicated by the difference in pressure between the



A Sectional Elevation of a Filter Chamber Showing the Perforated Spool Core and the Multiple Layers of Cloth Which Are Relied upon to Remove Finely Divided Solids and Grease from Boiler Feed Water

inlet and outlet sides of the filtering material. This difference is indicated by gages, of course, and cleaning is recommended by the maker when the difference between the readings of the gages becomes 10 to 12 lb.

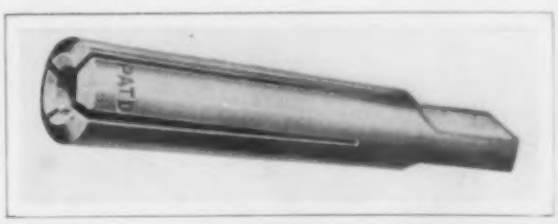
The covers of the filtering chambers have hinged slot bolts, and each chamber has a double-arm lifting davit mounted on ball bearings.

As an aid to cleaning and handling, a specially designed winding apparatus is furnished for removing and rewinding the filtering cloth and the flexible wire spacing mat on the spool. As the filter cloth is removed the spacing mat is wound on the lower spindle, and when the strip is being rewound it is held between two rollers, this arrangement to insure a smooth and tight winding. It is possible to cleanse the strip of linen like a piece of ordinary toweling so that it can be used repeatedly, and an extra spool is furnished if conditions should make it undesirable to keep the filter out of service while the fouled spool is being cleansed.

A One-Piece Chuck for Driving Taps

A chuck designed to take the place of the friction drive arrangements sometimes employed with taps has been placed on the market by Scully-Jones & Co., Railway Exchange Building, Chicago, Ill. It is intended for use on all kinds of work and it is pointed out that it is particularly useful in tapping aluminum and brass. Other points upon which special emphasis is laid are ease of use, no extra space required and the absence of screws, pins or frictions.

In use the chuck is placed in the spindle of the drilling machine the same as a drill. The tap is gripped by the body of the shank instead of by the square on the end, as it is pointed out in some cases the square on a tap is not true with the thread even though the tap may be perfectly good in all other respects. The chuck is made of a single piece of hardened steel and is finished to conform with the standard Morse taper. It is pointed out that a variation of 1/32 in. or more in the diameter of the shank will not interfere with the proper operation of the tap or if the square runs out as sometimes happens.



A Chuck for Driving Taps by Gripping Them on the Body of the Shank

Standardized Industrial Buildings

Modified Sectional Bookcase Principle Applied to Factory Construction—Prior Preparation of Material Reduces Cost

BY W. J. AUSTIN*

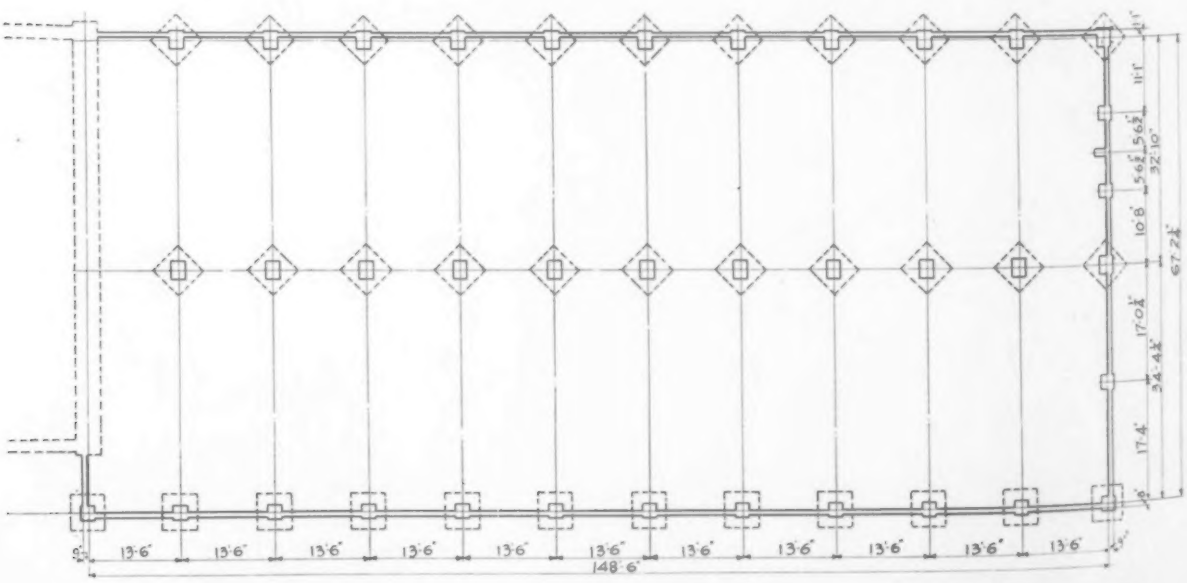
In all modern industry, practically without exception, the trend is toward standardized operation. The demand to-day is for big quick output at low cost. Standardization, which after all means finding the best way to do a thing and sticking to that way, is the answer to this demand. There is one industry, very old and yet always new, where standardization has yet to make itself generally felt. Architects, engineers and contractors, lumped together as a whole, are producing, yes even "manufacturing," buildings, for the public which needs them. Factory operation for producing building units has been standardized to a high degree in the last few years, but the units themselves have not been standardized to any great extent, either as to quality or size. Certain essential standard qualifications, such as the qualities of structural steel, sizes of brick and timber, dimensions of doors and windows, etc., have been developed, but as to their assembly or erection in the field in a complete unit, the structure itself, very little standardizing has been done.

At present when a manufacturer decides to erect a building, an engineer or architect is called in, and the general requirements are outlined. Plans are prepared to meet these requirements embodying the individual views of the architect as to designs, details, etc., modified by the preferences and particular needs of the client. Bids are then called for, and the contract awarded. Under these conditions there is much effort wasted between the inception, the owner's need of a building and the finished building.

Suppose when you wanted to buy an automobile, you employed an automobile engineer who consulted you on your needs, designed a machine that suited you, secured figures, and awarded an individual contract. How much do you suppose that machine would cost you? How long would you have to wait for it? Even if each car were built individually, does it not follow that, as all car designs would be based on very much the same schedule of needs, the cars in general would roughly resemble one another? They would all probably have four wheels with the same tread, motor in front and control from the forward seat. In short, as a whole, with the exception of a few freak cars, they would not be very different from the cars as now made. Each designer would, as far as possible, duplicate the best features of all the other cars and the situation would be very much the same as now except for an unutterable and almost prohibitive waste of engineering and assembling effort in meeting each individual need, which, after all, is the general need. Given these conditions, automobile owners would be few and far between. Consider the real situation in the field of individual transportation. There are available to-day sufficient varieties of standard machines, ready-made factory products, to meet in the aggregate practically an individual need of any kind or any combination of such needs. Standard makes have specialized along the line of meeting certain groups of needs as it were.

There must be a lesson in this condition which can be applied to building activities, especially those of any group of industries. While at present each building is treated as an individual need, essential needs cannot be individual. They have a way of being very common. Recognizing, of course, that it is impossible to manufacture and sell machine shops and foundries as automobiles are sold, yet building work can be, and it is being, standardized. Given any special industry, or any common activity of several industries, with definite housing requirements, the thing to do is to find the efficient

*Vice-president and general manager the Samuel Austin & Son Company, Cleveland, Ohio.



Foundation Plan of a Foundry Built According to the Standardized System of Industrial Building Construction.

expression of the common essential needs and develop building designs and construction operations to meet these needs.

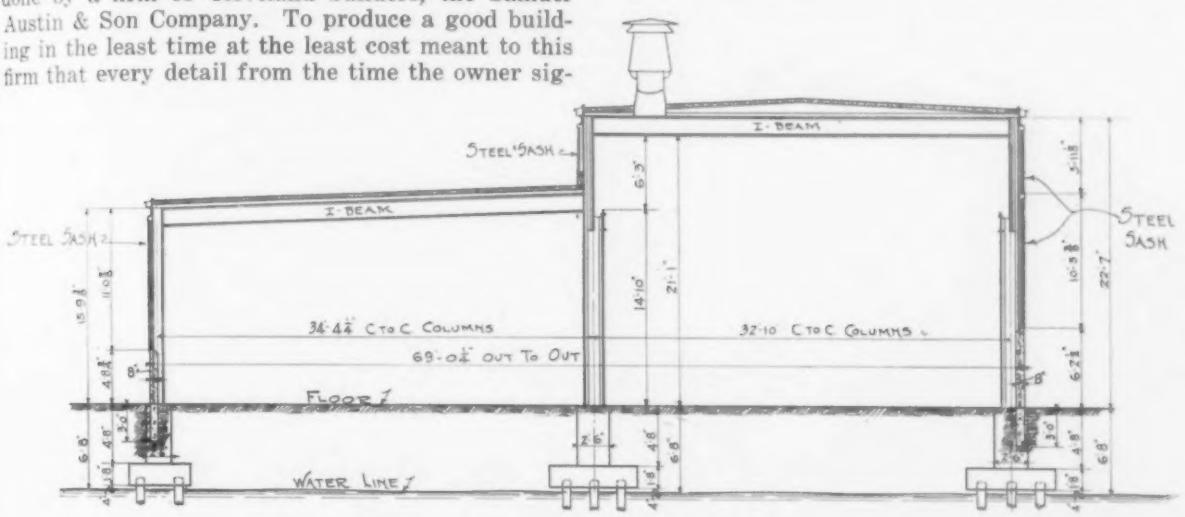
These are general truths about the building situation which must have been self-evident to any careful student of the construction field and building economics. The owner was paying too much for his building, not necessarily too much money, but too much in time and effort. Contractors were paying too dearly just for the privilege of building. At every point there was waste, a lack of coordinated effort in erecting and selling buildings.

One solution to this problem which has met with fair success is the development of standard types of industrial buildings to meet various needs. What is essentially pioneer work along this line has been done by a firm of Cleveland builders, the Samuel Austin & Son Company. To produce a good building in the least time at the least cost meant to this firm that every detail from the time the owner signifies his need of a new building to the time he moves in should be ready in advance, as it were. Plans, based on the best experience of factory needs, engineering requirements and construction conditions, are ready; building units, roof trusses, columns, steel sash, etc., are ready fabricated in depots and trained construction crews following standard schedules and routine do the rest. A building is practically "manufactured" on the site. The owner buys a complete building. The Austin Company, instead of bidding on an owner's plans for a machine shop, a foundry or an industrial building of any sort, is able to sell the owner a complete standard building.

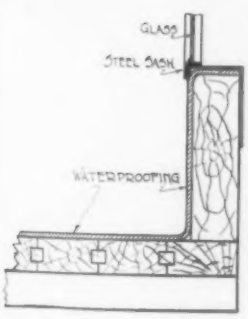
As an example of how standardization can be applied, a description of a plant built for the Covel Mfg. Company, Benton Harbor, Mich., is of interest. This firm needed a foundry. Actual details of construction were not important. The main thing was to get a good foundry building in a hurry at a fair cost. The Austin Company was putting up some work for a neighboring factory and the Covel Company, being interested, sent in an inquiry. The contracting engineer for the builder came at once, was able to offer a complete building at a definite cost and the deal was closed. The next day the chief engineer was on the job in response to a telegraphed request. Preliminary work started at once; steel was ordered on the fourth day and complete plans were ready five days later. The steel got in on the eighteenth day, in thirty-seven days the building was under roof and was complete the sixtieth day. This was not a rush job, but merely a normal product of standardized effort. When required, a building of this type could be put up in thirty days.

The foundry building of the Covel Mfg. Company represents what is considered a good type of modern steel construction, with concrete curtain walls, steel sash and a wooden roof with tar and gravel deck. The building is 66 ft. wide and 150 ft. long. It is divided into two bays, a 32-ft. monitor and a side bay 34 ft. wide. Provision is made for another side bay, so the building is in reality only two-thirds completed. The frame is of 10-in. 23½-lb. Bethlehem sections for the outside columns and the built-up lattice columns on each side of the monitor, the columns being spaced 13½ ft. on centers. These lattice columns are built up of 3 x 5 x 5/16-in. angles and ¼-in. flats up to the crane girders 14½ ft. above the floor, and 2½ x 3½-in. angles to the monitor roof 21 ft. above the floor. The roof beams are 18-in. 55-lb. I-sections in both the center and side bays.

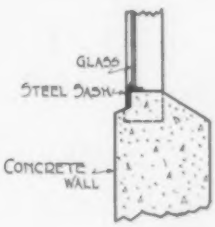
As the building site was on marshy ground pile foundations were required. Each column footing is a reinforced concrete mat, 5 ft. square and 18 in. deep, supported at the water line about 80 in. be-



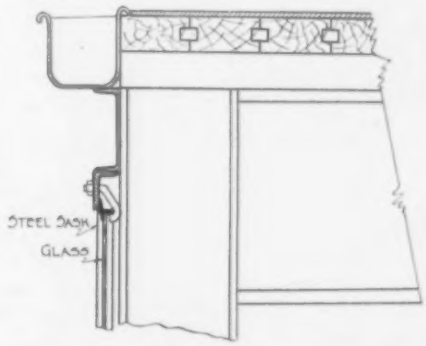
Cross-Section of the Building Showing the Pile Foundation and the Reinforced Concrete Mat Used to Support the Building Columns



Detail at Monitor Sill



Detail at Side Wall Sill



Detail at Eaves

low grade on a cluster of case piling. This spread footing in turn supports a concrete pedestal measuring 2 x 2½ ft. at the base and carried up about 56 in. to the grade where it is 2 ft. square in plan. In these pedestals anchor bolts were set, to which the structural steel columns were fastened. The concrete curtain walls, which are poured in place, are 9 in. thick and extend from 3 ft. below grade to the sill of the steel sash 56 in. above grade. Continuous steel sash extends from the curtain walls to the eaves, the sash being outside the face of the columns. The monitor is provided with a pivoted steel sash.

The roof is of 3 x 6-in. splined timber resting on 3 x 6-in. timber bolted to the top flange of the I-beams. Two details of the roof construction are carried out in an interesting way. One of these is the eaves detail. Resting on a stringer or facer along the top of the sash is a 7-in. channel with its flanges facing outward. Riveted to the bottom flange and coming down over the top of the sash is a 2 x 3-in. angle locking the sash in and proving an effective weather strip. This construction eliminates brick or other masonry work on the eaves and is considered a desirable and quick form of construction. Another interesting roof detail is at the point where the deck joins the side of the monitor. Here a 14-in. x 4-ft. timber is placed on the edge and the waterproofing is carried over this to the monitor sash. The steel sash is carried out to within 1 in. of the face of the outside wall. The mullions are set in and the sill is pointed up and troweled to produce a tight neat finish. The details of the above features of construction are shown in one of the accompanying drawings. At the corners a ⅜ x 12-in. steel plate is bolted to a 4 x 4 x ⅜-in. angle anchored into the corner of the concrete curtain wall and carried up to the stretcher channel above the steel sash.

The building was erected on a straight percentage basis. Its cost, owing largely to the unfavorable site which necessitated pile foundation, ran high, slightly exceeding $1 per square foot. It is believed the building could be duplicated under normal conditions at from 80 to 90c. per square foot.

Iron, Steel and Machinery Exports in 1915

Complete Statistics for the Calendar Year, Constituting the Banner Year in the Export Trade of the Iron and Steel Industry

WASHINGTON, D. C., Feb. 15, 1916.—The 12 months ended Dec. 31, 1915, constitute the banner year in the export trade of the iron and steel industry, according to figures just compiled by the Bureau of Foreign and Domestic Commerce. Exports of tonnage commodities exceeded the 1914 total by nearly 135 per cent and surpassed the high water mark of 1913 by 25 per cent. Shipments of machinery made a gain of 46 per cent over the calendar year 1914 and of 4 per cent over the unprecedented total of 1913. While the totals for the month of December fell short of the records of October and November, 1915, both as to tonnage commodities and machinery, extraordinary gains are shown in comparison with December, 1914, tonnage commodities increasing more than 200 per cent while machinery gained 110 per cent. The movement, which began in September, to work up a constantly increasing percentage of steel bars into shells and shrapnel, which are returned as "all other explosives" and do not appear in the tonnage figures, gained additional impetus in December; otherwise the tonnage total for the month would have broken all previous records.

MACHINERY EXPORTS

The exports of machinery in December, 1915, were valued at $13,228,450, as compared with $6,372,041 in

Exports of Machinery

	December		Calendar Year	
	1914	1915	1914	1915
Adding machines	$21,447	$58,885	$1,177,751	$554,381
Air-compressing machinery	22,084	59,366	388,870	503,643
Brewers' machinery	1,016	1,387	191,272	60,427
Cash registers	87,368	81,881	3,199,556	1,273,871
Parts of	8,572	6,442	68,273	101,971
Cotton gins	970	4,143	102,188	54,881
Cream separators	10,947	51,868	304,191	318,491
Elevators and elevator machinery	76,127	85,463	1,057,709	1,080,803
Electric locomotives	1,510	21,609	606,032	228,479
Gas engines, stationary	57,970	12,855	335,321	453,329
Gasoline engines	316,721	800,876	4,972,305	6,805,357
Steam engines	107,374	539,791	3,310,626	10,463,378
All other engines	50,396	101,744	704,006	1,051,738
Parts of	156,911	486,794	2,722,975	4,791,498
Laundry machinery, power	12,421	26,784	347,596	303,914
All other	12,925	28,417	448,242	262,710
Lawn mowers	6,236	14,576	376,187	282,175
Metal-working machinery (including metal-working tools)	2,432,331	3,205,788	14,841,380	42,037,779
Meters, gas and water	20,509	20,902	165,128	246,617
Milling machinery (flour and grist)	54,143	320,963	893,258	2,403,580
Mining machinery:			a 3,928,631	
Oil-well machinery	38,953	61,913	b 1,234,065	1,220,009
All other machinery	220,142	481,363	b 2,053,749	5,718,134
Paper-mill machinery	10,910	97,487	604,553	908,947
Printing presses	81,758	124,563	1,937,056	1,435,037
Pumps and pumping machinery	167,235	363,541	2,939,734	3,463,421
Refrigerating and ice-making machinery	32,218	66,221	570,820	802,542
Sewing machines	370,555	454,954	8,658,762	5,707,880
Shoe machinery	97,398	96,843	1,140,228	1,451,462
Sugar-mill machinery	187,595	958,399	1,814,137	5,363,160
Textile machinery	153,696	181,876	1,308,048	1,882,520
Typesetting machines	28,070	62,278	1,521,034	478,555
Typewriting machines	367,339	731,513	7,573,145	7,254,893
Windmills	60,136	61,233	1,085,730	894,122
Wood-working machinery, saw mill	8,041	24,998	460,548	339,413
All other	35,566	69,287	894,867	1,026,444
All other machinery and parts of	1,054,451	2,503,048	17,880,691	23,948,301
Total	$6,372,041	$13,228,450	$91,818,664	$134,128,862

a Figures are for six months, January to June, inclusive.
b Figures cover period since June 30.

the corresponding month of 1914 and $10,300,945 in December, 1913. Shipments of metal-working machinery, which made a high record in November, declined below the average for the 12 months, the total being but $3,205,788, which, however, was a 30 per cent gain over the exports in December, 1914. The total of the exports of machinery for the calendar year 1915 was $134,128,862, as compared with $91,818,664 in 1914 and $127,980,880 in 1913. Decreased shipments of steam engines in December as compared with October and November alone account for the shrinkage in the month's total exports of machinery.

The foregoing table shows the total exports of machinery for December, 1914 and 1915, and for the two calendar years:

EXPORTS OF IRON AND STEEL

The exports of iron and steel for which quantities are given aggregated 354,109 gross tons in December, 1915, as compared with 116,816 tons in the same month of 1914 and 181,717 tons in December, 1913. The total for the calendar year 1915 was 3,513,453 gross tons, as compared with 1,540,574 tons in 1914 and 2,730,483 tons in 1913.

The following table shows the exports of tonnage iron and steel by months for the year 1915, as compared with 1914:

Exports by Months

	1914, Gross Tons	1915, Gross Tons
January	118,768	139,789
February	121,198	144,553
March	159,999	174,269
April	161,953	223,242
May	139,110	262,755
June	143,953	355,829
July	114,790	368,893
August	86,598	401,298
September	96,482	381,317
October	147,293	351,128
November	140,752	362,765
December	116,816	354,109

Details of the exports of tonnage iron and steel in December and for the calendar year 1915, compared with 1914, are as follows:

Exports of Iron and Steel

	December		Calendar Year	
	1914, Gross Tons	1915, Gross Tons	1914, Gross Tons	1915, Gross Tons
Pig iron	6,746	21,807	114,423	224,499
Scrap	1,511	16,276	33,134	79,361
Bar iron	384	3,975	5,226	39,727
Wire rods	7,435	13,459	61,856	165,013
Steel bars	22,002	49,607	114,079	403,577
Billets, ingots and blooms, n.e.s.	3,430	49,912	50,496	560,728
Bolts and nuts	1,055	2,500	15,127	23,484
Hoops and bands	706	3,006	9,954	29,326
Horseshoes	1,687	544	5,903	15,862
Cut nails	138	248	3,423	4,216
Railroad spikes	168	2,629	6,937	13,297
Wire nails	3,785	8,488	36,079	91,632
All other nails, including tacks	306	1,083	2,182	9,249
Pipes and fittings	....	.....	a 104,487	.....
Cast-iron pipes and fittings	3,104	4,778	b 38,418	46,963
Wrought pipes and fittings	8,565	18,366	b 56,717	129,960
Radiators and cast-iron house heating boilers	272	337	3,572	2,288
Steel rails	3,567	41,102	174,680	391,762
Galvanized-iron sheets and plates	3,091	3,949	40,462	75,938
All other iron sheets and plates	203	2,584	7,555	25,548
Steel plates	6,810	17,907	111,642	222,473
Steel sheets	7,228	7,373	120,430	97,464
Structural iron and steel	10,758	18,920	182,395	232,937
Tin and terne plates	3,977	16,972	59,549	154,561
Barb wire	8,306	26,176	93,820	248,620
All other wire	11,582	22,111	87,022	224,968
Total	116,816	354,109	1,540,574	3,513,453

a Figures are for six months, January to June, inclusive.
b Figures cover period since June 30.

IMPORTS OF IRON AND STEEL

The imports of tonnage iron and steel amounted in December, 1915, to 35,455 gross tons, as compared with 9046 tons in the same month of 1914 and 26,454 tons in December, 1913. The total for the calendar year 1915 was 381,449 tons, as against 290,393 tons in 1914 and 316,368 tons in 1913.

The following table shows the imports of tonnage commodities for December and for the calendar year 1915, as compared with 1914:

Imports of Iron and Steel

	December		Calendar Year	
	1914, Gross Tons	1915, Gross Tons	1914, Gross Tons	1915, Gross Tons
Ferrosilicon	304	331	6,146	5,226
All other pig iron	3,374	11,289	132,757	84,610
Scrap	2,096	20,666	34,849	79,982
Bar iron	1,153	284	16,414	8,520
Structural iron and steel	94	79	10,145	1,509
Hoop or band iron	....	1	648	1
Steel billets without alloys	250	15	2,099	4,412
All other steel billets	1,145	865	38,089	10,586
Steel rails	251	1,280	22,571	78,525
Sheets and plates	69	113	4,310	1,421
Tin and terne plates	231	61	15,411	1,341
Wire rods	79	471	6,954	5,316
Total	9,046	35,455	290,393	281,449

Under a new system covering the preparation and examination of export declarations, which has recently been adopted, it is probable that a small proportionate increase in values but not in quantities will appear in the statistics beginning with those for January, 1916.

W. L. C.

American Iron & Steel Mfg. Company

At the annual meeting of the stockholders of the American Iron & Steel Mfg. Company, Lebanon, Pa., Feb. 9, directors were elected as follows: Edward Bailey, Harrisburg; Horace Brock, John W. Brock, B. Dawson Coleman, Edward R. Coleman, Thomas Evans and William C. Freeman, Lebanon; H. B. Hagy, Reading, and David Sternbergh, Reading. The directors then organized and elected these officers: President, James Lord; vice-president, John Penn Brock; treasurer, H. M. M. Richards; secretary, D. G. Scott; assistant secretary, Charles H. Forster; executive committee, John W. Brock, Horace Brock, Edward R. Coleman and W. C. Freeman.

President Lord, in his annual report, told the stockholders that the company had a prosperous year. The increase of undivided profits amounted to $303,267.45. The increased value of the plant, due to improvements, was $832,000, and an additional $75,000 was set aside for depreciation.

The summary balance sheet as at Dec. 31, 1915, is as follows:

Assets

Cash	$128,918.84
Accounts receivable	495,156.62
Inventory	1,808,269.30
Insurance and taxes, unexpired value	11,773.12
Real estate, plant, and equipment, less $1,180,000 allowance for depreciation	7,299,574.85
Total	$9,743,692.73

Liabilities

Wages and interest accrued not due	$83,104.02
Bills payable	1,300,000.00
Accounts payable	None
Preferred stock	3,000,000.00
Common stock	2,550,000.00
Undivided profits, subject to payment of dividends on preferred stock payable Jan. 1, 1916, and common stock payable Jan. 31, 1916	2,810,588.71
Total	$9,743,692.73

Marshall Field & Co., Chicago, have added approximately $40,000 to their investment in commercial vehicles by the purchase of 15 Packard light service motor trucks. This increases the Field fleet of Packards to 47 vehicles, 32 trucks having been purchased at various times since 1908. All these vehicles are still giving good service. The equipment of the fleet with electrical starting and lighting facilities is regarded by truck authorities as an important illustration of the present trend in delivering. The question of whether it is more economical to allow the motor to idle while deliveries are being made or to take time for cranking at each stop has long been discussed. This is solved by the starting system, for a pressure on the heel button is all that is required for a quick get-away, and the consequent saving in fuel, lubricant and wear of parts is an appreciable amount at the end of a year.

National Chamber of Commerce Convention

Washington Meeting of Business Men from All Sections—Tariff Commission Indorsed—Action on Scientific Systems in Government Shops

WASHINGTON, D. C., Feb. 12, 1916.—The fourth annual convention of the Chamber of Commerce of the United States of America held in this city on Feb. 8, 9 and 10 proved the most impressive gathering of business men ever assembled in this city of national conventions. Nearly 2000 were present, and more than a score of problems of deep significance to business interests were earnestly discussed and recommendations thereon were adopted in nearly all cases by decisive majorities. Among the subjects to which attention was given and upon which action was taken were the proposed non-partisan tariff commission, protection to American industries after the war including anti-dumping legislation, the American merchant marine, the national defense, the necessity for a national budget, the desirability of more accurate commercial statistics, the necessity for Federal legislation in the interest of price maintenance, the safeguarding of scientific shop management systems, immigration and education.

NON-PARTISAN TARIFF COMMISSION

Unanimous and enthusiastic indorsement was given to the proposition to create a non-partisan tariff commission, as set forth by Daniel P. Morse, New York, chairman of the special committee appointed to consider the subject. Discussion followed the presentation of the report as to whether the proposed commission should merely investigate conditions and report the facts to Congress or whether it should be permitted to make recommendations in the framing of tariff schedules. Some expressed the opinion that it should be given the power to recommend tariff changes, believing that otherwise its establishment would result merely in the collation of a mass of figures and statistics that would befog the issue, but the preponderance of expression was against any provision which might be held to be usurpation of the rights of Congress. The prevailing view was that the commission, at the outset at least, should confine itself to collating facts and that later, as it gained the confidence of Congress and of the people, its jurisdiction might be broadened into an organization with comprehensive powers similar to the Interstate Commerce Commission. An unequivocal indorsement of the tariff commission idea, given by President Wilson in his address before the Chamber, was received with much applause and it is believed that the sentiment developed by the convention on this important question has done much to hasten Congressional action on the pending tariff commission bills.

INDUSTRIAL PROTECTION AND DUMPING LEGISLATION

A conservatively phrased resolution was adopted dealing with the question of industrial protection. It was pointed out in this resolution that the present disturbed condition of commerce has caused a suspension of the importation of various goods; that this condition has clearly demonstrated the wisdom of making adequate provision for the fullest development of this country and therefore that Congress should be urged to make an investigation through an appropriate agency "to ascertain the industries which in the national public interest should be developed and enact legislation to promote this development." Dealing more specifically with the dumping problem, the Chamber adopted the following resolution:

Whereas, The European conflict has produced abnormal economic conditions abroad; and

Whereas, Articles produced under such conditions may represent a large percentage of the probable imports after the close of the war; and

Whereas, Such importations would be highly detrimental to our industries, without proper consideration being given to the conditions under which such goods have been produced;

Resolved, That the Chamber of Commerce of the United States of America petition the President and Congress to take prompt action to refer this question to such Government agency as is best equipped to ascertain all facts in the case and base thereon all necessary legislation in order to prevent such abnormal foreign competition.

THE AMERICAN MERCHANT MARINE

The report of the special committee on the subject of legislation in the interest of the American merchant marine, of which William H. Douglas, New York, was chairman, was adopted after an extended debate which demonstrated that the delegates were practically unanimous on all the leading points of the question at issue. The committee stated that it felt "that we have public opinion back of us which justifies us in demanding of Congress that adequate laws be passed to place our merchants on an equality with other merchants in trading in the world's markets and to provide as well the merchant vessels necessary to co-operate with our army and navy in case of need." Referring to the so-called Administration shipping bill the report said:

It is very clear to your committee, and we believe is to all who have studied this issue, that the Government proposal will not be a satisfactory measure to accomplish what is essential, and that if fifty millions of Government money is to be used, it should be so employed as to attract and make possible the securing of many hundreds of millions of dollars of the people's money which we believe would go into shipping if they were satisfied of the Government's sympathy, co-operation and protection, thus insuring permanent, comprehensive and continuous upbuilding of our commerce. The American people have never been called upon to carry out any policy for the nation's good without responding, and they would do so unquestionably in this instance if the Government does not shut the door of opportunity in their face.

Declarations by delegates that the Chamber had reached a point in the development of this important question where it was "no longer afraid of the terms 'subsidy' and 'subventions'" were received with enthusiastic applause.

NATIONAL DEFENSE

While the convention indorsed in general terms the development of the national defense to an adequate basis, as recommended by the special committee of which B. J. Arnold, Chicago, was chairman, it was decided to take a referendum as to the best method of reaching this basis and steps will be immediately taken to bring this question before the trade bodies affiliated with the National Chamber in order that a vote may be had in time to be of assistance to Congress in dealing with this great issue. A suggestion of the special committee of the Chamber having this matter in charge looking to the mobilization of the industries of the country attracted a great deal of attention and was the subject of much favorable comment. This proposal was as follows:

That legislation be enacted, the purpose of which will be to induce manufacturers and others to register in confidence with the Staff details as to their physical equipment, personal organization and specialized capacity. Legislation providing for the inspection of such plants as to their efficiency. Legislation allowing the placing of yearly orders for munitions with such plants as pass inspection, as an inducement to the plants to keep their organization in training and their equipment in readiness to serve. Legislation providing that the Government may take option agreements on such plants on a lease or stock percentage basis whereby these may be taken over and insured by the Government when required for use in time of war. This legislation should, in addition to industrial plants, chemical establishments, textile plants,

food producing plants, etc., include contractors' equipment, railroad, steamship and other transportation facilities.

NECESSITY FOR NATIONAL BUDGET

The importance of co-ordinating the receipts and expenditures of the Federal Government and of centralizing the responsibility for the budget bills in Congress, which is now divided among half a score of wholly independent committees, was emphasized in a report to the Chamber by a special committee headed by R. G. Rhett, Charleston, S. C., which, during the past year, has given a great deal of thought to the subject. A conference of the committee with the President of the United States resulted in the President's hearty indorsement of the national budget plan and a promise to do everything in his power to secure the necessary legislation. Upon the conclusion of the discussion of this subject by the Chamber a resolution was adopted expressing approval of the proposed budgetary system and urging on the President and Congress "the advantage of, if not the necessity for, a great improvement in the present methods of preparing and publishing estimates both of expenditures and of revenue."

MORE ACCURATE COMMERCIAL STATISTICS

As the result of the activity of the Chamber of Commerce the statistical methods of the Bureau of Foreign and Domestic Commerce have been greatly improved the past year. The special committee on statistics and standards appointed a year ago to take the matter up succeeded in convincing the officials of the Department of Commerce that the figures relating to imports and exports, and especially those representing the value of exported commodities, were grossly inaccurate. The matter was promptly taken up by Secretary Redfield and Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, and a new system of inspection of consular invoices and more rigid requirements for export declarations has recently been installed. It is expected that this reform will result in much greater accuracy in statistics which are of great value to all parties interested in our foreign trade. Incidentally, it is probable that the changes will result in a substantial increase in the reported values of manufactured goods exported.

PRICE-MAINTENANCE LEGISLATION

The special committee of the Chamber appointed to consider the desirability of Federal legislation for the maintenance of resale prices, of which Prof. Paul T. Cherington, Harvard University, was chairman, decided by a vote of seven to three in favor of Congressional action permitting price maintenance. Notwithstanding the decisive majority by which this report was adopted the Chamber decided to take a referendum on the subject. The majority report called attention to the fact that the National Chamber committee on this subject had rendered a report a year ago favorable to the principles of price maintenance and asserted that the majority members saw no reason in any way to modify the conclusions arrived at and given to the Chamber at its last annual convention.

"On the contrary," the report added, "your committee is convinced that legislation permitting the maintenance of resale prices under proper restrictions on identified merchandise, for voluntary purchase, made and sold under competitive conditions, would be to the best interest of the producer, the distributer and the purchasing public or consumer."

Two members of the majority, in addition to indorsing the report of the committee, suggested, in a supplemental report, the insertion in section 5 of the Federal Trade Commission act provisions which would have the following effect:

> In regard to products that are identified in their sale to the public by name, brand, or trademark—and that are made and sold under competitive conditions: No merchant, firm, or corporation shall offer such articles for sale at a price other than that stipulated by the producer for the original sale of the articles at retail (provided the producer has given due notice of such price to the retailer by mark upon the article or otherwise); with the purpose or effect of: (a) Making it unprofitable for other retailers to handle said articles. (b) Promoting the sale of a substitute or imitation. (c) Attracting trade away from competitors, where the result is to injure the reputation of said articles or the good-will of their producers or materially to impair the general distribution of said articles.

The seven majority members of the committee also united in a statement that "while the work of the committee has been confined in its instructions to identified merchandise, it believes that the principle involved in this recommendation is capable of extension to a much wider field and that the predatory cutting of prices on merchandise in general has been and is a favorite method of oppression on the part of unfair business to destroy small competitors and local producers and that legislation could very properly define such practices as an unfair method of competition."

SCIENTIFIC SHOP MANAGEMENT SYSTEMS

The attention of the National Chamber was sharply drawn by the Boston Chamber of Commerce to the necessity of action by the manufacturers of the country to prevent further legislation by Congress antagonistic to scientific shop management systems. The history of the so-called Deitrick amendment to the army and navy appropriation bills in the last Congress was reviewed at length and the probability that when the immediate plans regarding Government shops have been consummated further effort will be made to extend similar prohibitions to establishments furnishing material or supplies to the Government to the extent of even prohibiting Government purchases from private plants unless completely operated in accordance with the terms of similar prohibitive special legislation was pointed out and strongly emphasized. On motion of the delegates representing the Boston Chamber the following resolutions were adopted:

> *Whereas*, Legislation designed to interfere with the development of industrial efficiency by fixing a level of mediocrity in achievement and withholding from individuals the rewards of superior ability is contrary to the ideal of our nation, which grants to every man the right to advance himself as far as his ability permits; and
>
> *Whereas*, Such uneconomic and short-sighted legislation was adopted in the army appropriation bill for 1915-16, through a rider known as the Deitrick amendment, which prohibited the making of time studies and the payment of premiums and bonuses to employees; and
>
> *Whereas*, Such restriction upon Government arsenals and workshops not only seriously hampers their economic administration under present conditions, but also constitutes a dangerous handicap upon their proper development; now, therefore, be it
>
> *Resolved*, That the Chamber of Commerce of the United States of America in annual meeting assembled voices its emphatic opposition to any legislation restricting the determination of standards of efficiency, or prohibiting remuneration based upon individual ability as measured by such standards, in any department of the Government; and be it further
>
> *Resolved*, That the Chamber of Commerce of the United States of America urges the Senate and House of Representatives to reject any such legislation introduced at the present session of Congress.

OFFICERS ELECTED

The election of officers of the Chamber for the coming year resulted in the selection of R. G. Rhett, Charleston, S. C., as president, to succeed John H. Fahey of Boston, who was unanimously chosen honorary vice-president. The general officers of the Chamber were re-elected and the following were appointed to succeed the 13 members of the board of directors whose terms expire at this session: Edward A. Filene, Boston; James R. MacColl, Providence, R. I.; W. L. Clause, Pittsburgh, Pa.; E. W. McCormick, New Brunswick, N. J.; Granger A. Hollister, Rochester, N. Y.; R. A. O. McCormick, Baltimore, Md.; Homer L. Ferguson, Newport News, Va.; Leon C. Simon, New Orleans, La.; S. B. Anderson, Memphis, Tenn.; Charles Nagel, St. Louis, Mo.; William Butterworth, Moline, Ill.; F. A. Seiberling, Akron, Ohio, and L. S. Gillette, Minneapolis, Minn.

W. L. C.

The Effect of Nitrogen in Steel

Results of a German Investigation at the Krupp Plant—Nitrogen Added to a Pure Low Carbon Steel

The subject of nitrogen in steel is one that has excited a great deal of interest, but not much has been published on it. A paper by Dr. B. Strauss, director of the physical-chemical testing laboratories of the Krupp plant at Essen, is particularly interesting. It appeared in *Stahl und Eisen*, and a quite full abstract is here given:

The work was begun in 1911 when an examination of the junctions of electrically-welded plates showed a peculiar microstructure. Small needles were seen in the ferrite, as shown in Fig. 1. The same structure had also been found in a specimen of soft steel that had been nitrogenized, so a thorough investigation of the question of nitrogen in steel was begun.

Fig. 1—Steel Nitrogenized by Heating Nine Hours in Ammonia at 600 Deg. C.

EFFECT ON WELDED STEEL

It was first determined that in the seams of electrically-welded material up to 0.12 per cent nitrogen was present, and in those of material welded autogenously with acetylene only up to 0.02 per cent. It is known that there is very little reaction between nitrogen and solid iron, and even liquid iron absorbs only very small amounts, as shown by the low percentage found in steels made by the Bessemer process. According to carefully carried out tests at the Krupp plant the nitrogen in acid and basic Bessemer steel varies from 0.012 to 0.030 per cent and in open-hearth steel from 0.001 to 0.008 per cent.

Tests were made in the laboratory to nitrogenize molten pure iron through the introduction of ammonia and nitrogen, but without success. The higest amount found was 0.03 to 0.04 per cent, the results being the same whether ammonia or nitrogen was used. As in steel production there is an automatic upper limit, no special precautions against nitrogen have been sought, and little attention has been paid up to the present to nitrogen and its influence on the properties of steel.

NITROGENIZING SOLID IRON WITH AMMONIA

It is well known that solid iron can be readily nitrogenized by ammonia through the nascent nitrogen produced by decomposition. It was determined that this process begins at 300 deg. C., and is most active at 600 deg. to 800 deg. C. Above 800 deg. C. the rate of absorption again decreases. The limit of absorption is 11.1 per cent, nitrogen corresponding to nitride of iron, Fe_4N_2. A soft very pure steel with 0.12 per cent carbon, after being nitrogenized with ammonia for nine hours at 600 deg. C. shows in the etched microsection a bright brittle layer of iron nitride, then a brown zone, then the above-mentioned needles, and after an almost structureless layer comes the normal structure with ferrite and pearlite (see Fig. 1). With long etching the structureless layer shows the crystal junctions.

A very pure electrolytic iron after treatment for twelve hours at 750 deg. C. shows three zones on etching with picric acid, first the nitride, then a structure very similar to pearlite, and finally the needles as shown by Fig. 2. The second zone contains a constituent similar to pearlite, to the formation of which probably both carbon and nitrogen have contributed. It takes a brown color with etching. The carbon comes from pyridine present in the ammonia fumes. Fig. 3 shows the same metal given the same treatment with ammonia as pure as possible where the brown zone is much smaller.

The paper then gives some most interesting and beautiful photomicrographs in natural colors of heat-tinted specimens. If carbon steels are nitrogenized, or if soft steel is carbonized and nitrogenized, for example, with illuminating gas and ammonia together, then a new constituent is found. In the etched section, alongside the pearlite, clear brown areas are seen, somewhat similar to sorbite. This is probably the flavite previously described by J. Kirner. In the investigation of hardened specimens the nitrogen was found to vary from 0.01 to 0.10 per cent.

The needles are believed to be slip lines, and others, that show on deep bending, are Neumann or twinning lines. An explanation for the slip bands is given by Le Chatelier as being due to the brittleness of the ferrite crystals caused by the nitrogen. They are remarkably susceptible to deforma-

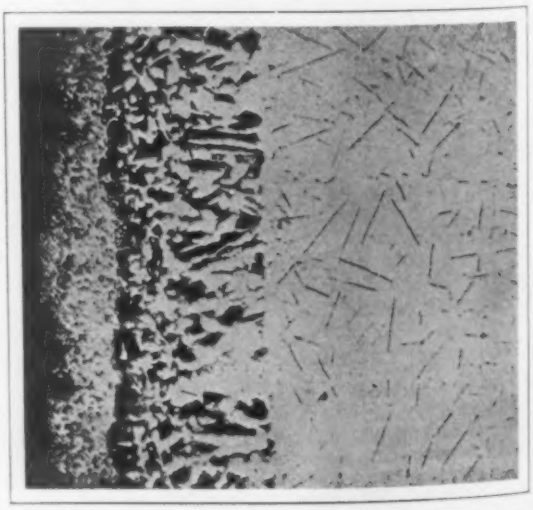


Fig. 2—Electrolytic Iron Heated 12 Hours in Ordinary Ammonia at 750 Deg. C.

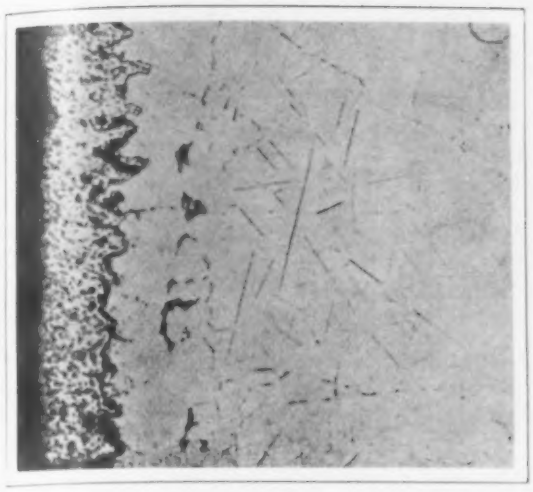


Fig. 3—Electrolytic Iron Heated 12 Hours in Pure Ammonia at 750 Deg. C.

tion, which is brought about by the preparation of the samples in the cutting and polishing. These slip bands may be seen in all well polished specimens. In the seams of welded material severe strains are set up by the cooling, and the needles are found in less amount in material welded with oxy-acetylene, compared with electrically-welded seams, due to the lower percentage of nitrogen. It is also seen that the nitrogen is dissolved in the ferrite and causes increased brittleness and cleavage.

EFFECT OF ADDING NITROGEN TO PURE SOFT STEEL

In the table are given some results of tests on a pure low-carbon steel of the following analysis:

	Per Cent
Carbon	0.07
Manganese	0.30
Sulphur	0.014
Phosphorus	0.021
Silicon	0.05
Copper	0.06
Nitrogen	0.004

The bars were 12.5 mm. diameter (0.492 in.), and were treated as shown. The outermost layer was removed and the nitrogen percentages given are the average over the whole section. For comparison results are given of bars treated in nitrogen and hydrogen. The test pieces were 12 mm. diameter and 120 mm. between punch marks (0.472 in. and 4.72 in.).

TABLE OF RESULTS OF TESTS ON PURE LOW CARBON STEEL ANNEALED IN NITROGEN, HYDROGEN AND AMMONIA

No.	Annealed at 700 deg. C. in:		Nitrogen, Per Cent	Elastic Limit, Lbs. per Sq. In.	Ultimate Stress, Lbs. per Sq. In.	Elongation, Per Cent	Reduction of Area, Per Cent
1	Nitrogen	48 hrs.	0.004	44,230	50,350	31.8	81
2	Hydrogen	48 hrs.	0.004	40,110	49,360	31.5	81
3	Ammonia	24 hrs.	0.10	46,510	59,170	24.2	75
4	Ammonia	48 hrs.	0.11	46,510	58,460	21.8	75
5	Ammonia	72 hrs.	0.16	49,780	60,880	22.5	71
6	Ammonia	96 hrs.	0.22	48,360	63,860	21.8	66

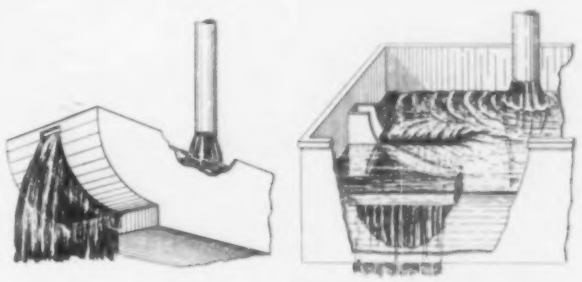
From recalescence curves of the soft steel and steel with 0.22 per cent nitrogen it was found that the A_1 point is lowered. With continued heating at higher temperature the nitrogen decreases and the Ac_1 point is again found at about 960 deg. C. The magnetic properties were investigated and induction curves are given in the original paper of bars 6 mm. diameter (0.236 in.) nitrogenized for varying times in a stream of ammonia. The nitrogen percentage decreases from the outside to the center. The magnetic properties are harmed by the nitrogen, the permeability is lower, and the hysteresis and coercitive force higher. A very peculiar result was obtained with a low-carbon 4 per cent silicon steel that was nitrogenized. The hysteresis increased considerably, without the coercitive force rising.

On annealing the nitrogenized samples in a vacuum, there is decomposition at 520 deg. C., which becomes more active at higher temperatures. Heated in hydrogen the nitrogen passes off in the form of ammonia as low as 400 deg. C., and even when heated in nitrogen at higher temperatures the iron nitride decomposes. In thin sheets of basic Bessemer, for example, this decomposition may cause blowholes. If the metal contains other elements in solution, such as silicon or chromium, then nitrogenizing at higher temperatures, such as 800 deg. C., or annealing of samples previously treated at 600 deg. C., will give nitrides of these elements which are much more stable than the iron nitride.

G. B. W.

Weir Meter with Cycloid Orifice

As the result of a series of experiments covering six or eight years the Kennicott Company, Chicago Heights, Ill., will shortly place on the market an improved type of meter for measuring the discharge through weirs. The feature about this new meter is the use of a cycloid discharge orifice. This peculiar arrangement, it is emphasized, gives a discharge having an exact proportion to the head, so that the necessity of employing a complicated computing device, as is the case with meters employing other forms of orifices, is eliminated.



Portion of a Meter for Measuring the Flow of Water Through a Weir Showing the Discharge from the Cycloid Orifice and the Position of the Orifice

The form of the orifice is covered by patents issued to the company and the weir is a single casting which is placed in the meter as a complete unit as illustrated at the right of the accompanying illustration. A special jig is used in machining the orifice. The registering mechanism used in connection with the weir is simple. One of these meters has been in operation in the boiler room of the Kennicott Company for approximately eighteen months and the results are said to be entirely satisfactory. It was the success of this meter which led the company, it is stated, to place the device on the market.

An Alloy for Rolls

An iron alloy which will produce cast chilled rolls or sand rolls having a very hard surface with a strong central portion is covered by a patent (U. S. 1,166,342—Dec. 28, 1915) granted to H. E. Field and F. C. Daniels of Wheeling, W. Va. The range in composition is thus stated: Silicon, 0.25 to 1.50 per cent; sulphur, 0.025 to 0.20 per cent; phosphorus, 0.010 to 1 per cent; manganese, 1.50 to 3.50 per cent; carbon, 1.50 to 3.50 per cent, with iron as the remainder. In rolls of this analysis the chilled surface cannot be machine-finished except with grinding machines. The surface hardness, it is claimed, does not lessen with use and the rolled material has a bright, smooth finished surface.

The New Place of Magnesium in Industry*

Its Uses in Alloys and as a Scavenger in Steel—Method and Cost of Manufacture —Some of Its Remarkable Properties

BY DR. WILLIAM H. GROSVENOR

You all know the chemical position and character of magnesium, leading member of the alkali earth division of the second group, atomic weight 24, closely related in its properties on the left with sodium, 23, on the right with aluminum, 28, with berilium, 9, above it and calcium, 40, below. Note the comparative lightness, specific gravity: Mg = 1.75, Na = 0.98, Al = 2.6, Be = 1.64, Ca = 1.6. Also the melting points: Mg = 750 deg., Na = 96 deg., Al = 660 deg., Be = about 900 deg., Ca = about 760 deg. All are more or less soft white metals, all show great avidity for oxygen, decomposing water more or less readily. None except aluminum has found large commercial use, but, of the others, magnesium leads the list by a long distance.

Its chief uses are:

Scavenging alloys, i.e., clearing up oxides of other metals and making far denser, cleaner, stronger and more homogeneous alloys. It is valuable in aluminum, nickel, copper, brass, bronze, etc., and special steels, because of its intense avidity for both oxygen and nitrogen.

Alloying itself, with aluminum or aluminum containing traces of one or more of the other metals Cu, Ni, Zn, Pb, Bi, Sb, Fe, etc. Magnesium greatly modifies crystallography and physical properties and alloys readily with most metals and melts at a convenient heat.

Illumination as in military uses for shrapnel trailers, star bombs, flare lights, etc., and in photography for flash lights. Its easy inflammability (about 800 deg. C.), the high heat of combustion (134,000 cal.), the relatively low heat of vaporization (1100 deg. C.), the intensely white oxide produced and the high temperature of volatilization of this oxide are the essential factors.

MANUFACTURE AND PRICE

How much is used? Records of imports for the year prior to the war indicated 38,000 lb. About 100 lb. a day, therefore, seemed to be a safe production to undertake. Prices before the war had been very steady around $1.45 per pound, but it seemed reasonably certain the cost need not exceed $1 per pound, and after the war began the prices being paid for remnants of imported lots quickly rose to $2.50.

Some of the first demands here were from wholly unexpected quarters, in surprising amounts and at amazing prices. The most urgent, almost pitiful demands, came from quarters that were not even suspected to be interested in the least. One consumer has contracted for 24,000 lb., another for 15,000 lb., these two alone taking for strictly domestic use more than was supposed to be the total importation. There are at least three other buyers of similar quantities, but exact amounts are not yet established. Sales are largely made by yearly contract, and even at present prices the consumption for strictly domestic use is about 50 tons.

We found that a great deal of the material was being imported under other names and most carefully disguised—secrecy being preferred to economy. Prices as high as $10 per pound were gladly paid at first for the domestic product. For some months then the prices jumped around from $5 to $7.50, but every effort was made to reduce conditions to some sort of order by dealing direct with the consumer. This was partly the result of a deliberate policy for better and more intelligent service of the consumer's precise demands as to quality and delivery, but partly also the result of meeting quite unexpectedly the competition of our own product at prices from 25 per cent below to 50 per cent above the prices we had made. Some of New York's clever war brokers added 10 per cent each through a chain of four or five middle men. Others assumed direct quotations to have already been through this process and knocked off 20 per cent, trusting that "real cash business" would squeeze down the middle men they supposed to exist and still leave 5 per cent for the real seller. Now, however, for a number of months the price has been practically fixed at $5.50 per pound of "guaranteed 99 per cent," actually about 99.5 per cent metal. Occasionally a lot that has been picked up in the antebellum market for speculation is let go at lower figures or a lot of lower grade material comes on the market from abroad, but there is practically no volume of these sales.

In spite of the beautiful appearance of the German bars they rarely exceeded 98 per cent, and often fell as low as 96 per cent. The process of extrusion concealed impurities by drawing them out into minute threads. It is safe to say that the regular commercial grade of metal made here now is superior to anything ever imported.

REASONS FOR THESE PRICES

It may seem ridiculous to ask or pay such prices. The alloy market constitutes the bulk of the business and governs prices. In aluminum castings, for instance, about less than 2 per cent of magnesium cleans up the aluminum and leaves 0.75 to 1½ per cent in the casting, about doubling its tensile strength, and quadrupling its resistance to shock or jar. It reduces the cost of machining more than 50 per cent, halving the number of resets on the cutting tool, giving clean cut machine surfaces, and permitting a polish to be secured with the last cut instead of a separate operation. With care, 1½ per cent of magnesium at $5.50 per pound, is all that is needed, *i.e.* 8¼c. per pound of casting actually required to do the same work. The increase in strength means, in some cases, a reduction in weight of casting of 50 per cent.

The reduction in casting weight is generally not less than 25 per cent. The weight of a pure aluminum casting may therefore be reduced if this 1½ per cent of magnesium is used by from 25 to 50 per cent. This is a great saving even at normal prices of aluminum, since it amounts to about one-fourth of 20c., or 5c. With aluminum at 60c. per pound, it amounts to 15c. worth of aluminum saved for a stronger and more stable mechanical result. The saving in machine work alone, when the casting is to require much machining, more than pays for the use of magnesium. So much for the consumer or user.

The manufacturer of magnesium has at present certain considerations (of necessity rather than mere excuse) for the high prices. Cost of production abroad prior to the war approximated $1 per pound. Sales in England were about $1.30 and here about $1.45 per pound. At that time magnesium chloride $MgCl_2 6H_2O$, was selling for about $18 per ton. Present prices here are now about $60, nearly four times normal. Other chemicals used in the manufacture have increased to ten times their normal price. One other factor, *i.e.* insurance, must be considered in two forms. First, the insurance against cut prices and dumping that may come immediately upon the close of the war, making the plant and market-development work absolutely worthless. Second, the insurance against partisan interference. As a matter of fact in the case of two plants, not a pound of material from either of which has gone for foreign military purposes so far as we know, there have been repeated efforts at molestation

*From a paper read before a joint meeting of the New York sections of the American Electrochemical Society, the American Chemical Society and the Society of Chemical Industry at the Chemists Club, New York, Feb. 11, 1916. The author is a consulting chemical engineer of New York.

and some serious interruptions. Finally, there is the general consideration of relative price advance compared with other materials, sulphuric acid from $12 to $60, five times; nitric acid from 4c. to 12c., three times; sodium hydrate, 1½c. to 5½c., nearly four times; sodium carbonate, 1c. to 4c., and numerous other commodities not directly affected by inability to import.

In considering prices it is well to mention separately export prices. Before the war nearly all the magnesium for England, as well as the United States and France, came from Germany. Since the war both France and England are producing in considerable quantities and of excellent purity. This fact and the failure abroad to realize the strenuous conditions here, account for the unwillingness of buyers abroad to pay more than $3.50 for powdered metal (all the above named prices were ingot or bar).

PRESENT PRODUCTION AND POSSIBILITIES

At present there is being produced here at two points about all the present alloy market will absorb, and an increase of plant is being made of about 25 per cent the present capacity. One other producer only makes about his own requirements. Two others are soliciting business, but have failed to fill orders—in one case the order is now over a year old and still stands unfilled. All told we believe the present production is at the rate of something over $1,000,000 a year and will be slightly in excess of the present domestic needs.

The use of the metal for scavenging purposes depends on price of metal compared with price of material to be scavenged. For use with copper, brass, bronze, etc., the magnesium can be used at far higher prices than for steel. But the big consumption of the material can only come when it directly replaced aluminum as the predominant metal in the alloy, and arrives at a correspondingly low price. It makes beautiful castings, machines easily and well, is about a third lighter than aluminum and can be made about two to four times as strong. The coefficient of expansion reported is practically the same as aluminum. When properly pure (over 99.5 per cent) it is apparently quite as resistant to corrosion as aluminum, equal if not superior in electrical conductivity (about half that of copper) and superior in heat conductivity to aluminum (also about half that of copper).

PROCESSES OF MANUFACTURE

The various possible methods of producing magnesium are:

1st. Reduction of fused $MgCl_2$ with sodium.
2nd. Electrolysis of the fused double chloride of magnesium, usually $MgCl_2KCl_2$.
3rd. Reduction with carbon (Patented).
4th. Electrolysis of dissolved magnesium oxide (Patent applied for).
5th. Reduction of fused $MgCl_2$ with aluminum (Applied for).
6th. Reduction of oxide or carbonate to slag forming residues (Applied for).
And some others.

The first process involves the production of metallic sodium, and we have been using the Castner process for this purpose to satisfy ourselves just what the sodium would cost and what the possibilities in this direction were. Existing conditions, the demand for sodium and sodium peroxid, forbid its consideration with a minimum of about two pounds of sodium consumed for every pound of magnesium produced, and the necessity of producing dehydrated fused $MgCl_2$ to start with.

The second process has been perfected and is very largely used abroad. We have commercially used and studied the process here and, with the cheapest water power and chloride, prices even under normal conditions by this process *must* rule above $1.

The third process, reduction with carbon, is absolutely fascinating in its possibilities. The product is a black or gray powder. Believing such a product would be valuable, the manufacture was carried out on a scale of about 25 lb. per hour. As the difficulty of selling the product became apparent, much time and effort were devoted to attempts to recover the metal in fairly pure form. Owing to serious objection both on the side of cost and regularity of product this process was superseded.

The other processes will be discussed on some other occasion when the engineering problems they involve are believed to be finally solved in the best way and the patent office has finished considering them. The chemical side of each has been thoroughly worked out, however, so that some conclusions may be drawn from the large laboratory or small commercial operations. These may be of considerable interest.

SOME DETAILS AS TO COST

At least one of the processes appears to be adapted to produce directly metal averaging 99.6 per cent purity in tons per day instead of pounds. Laboratory tests give a raw material cost of 4c. per pound of magnesium and indicate a fuel cost which approaches 3c. as a theoretical limit, though the practical figure will probably be several times as high. The final selection of various possible engineering means and methods remains to be worked out, but it scarcely seems possible that either labor or repairs should exceed 2c. per pound. Thus if commercial yields maintain the experimental level and three times the theoretical power is commercially required, we have prospects of a net factory operation cost (without interest, amortization, insurance, patent, administration or selling) of 17c. per pound. If only 75 per cent yield is obtained this net factory cost would be about 22c. or a total cost with all overhead expenses of 35c. and a selling price of 40c. to 50c., according to tonnage.

It may be asked with perfect propriety, "Why talk about it now? Some fool will certainly want you to make a contract with him at lower prices, possibly at 50c. He will not realize that it is only the present price of $5.50 that justifies or even makes possible the $1,000 and $10,000 experiments that have been tried and must be tried again and perhaps again during the next three to five years before the tide turns. You will be pestered for years with this 17c. talk."

We have carefully considered this probability. The men who are doing this work do not cultivate talkativeness as a preference. Just at this time, however, certain consideration of public welfare should take precedence of preference. National self preservation demands the subordination of personal interest. If we are to have the army and navy preparedness for which we have already wasted more money than Germany has paid for her wonderfully efficient fighting machine, if we are to have any preparedness instead of repairs or regrets, we must co-operate with all we have in service, information and suggestion.

SOME OF ITS POSSIBILITIES

Therefore, at the risk of criticism and possible financial sacrifice, it seems to be a duty at this time to point out what may possibly be expected of magnesium. Few realize the extent to which it is valuable in military work. One of the great foreign explosive experts stated that he would be glad to pay $1.50 per pound for 500 tons. A single contract for shrapnel being executed in this country would require about 50 tons. The illuminating bombs to make daylight over the enemies' works and trenches consume large quantities. The trailers attached to shells serve at night to show the effectiveness of the fire. For all these purposes magnesium produces a result that cannot be approached by antimony or aluminum. But consider what it means to aeroplane, dirigible, and motor construction, to high speed engines of every type, to reduce weight one-third and double strength. A material that has a density of 1.75 and may be hot rolled to a tensile strength of 35,000 lb. per square inch or cold rolled very much higher. Although five or six men are being kept practically all their time on the development of these possibilities, the broad, quick development is a task for the energy of hundreds, even thousands. Feeling the responsibility which knowledge of the possibilities entails, it became the duty of those in charge of this work to let others know and be active in their side of preparation to apply the material.

Book Reviews

The Authentic History of the United States Steel Corporation. By Arundel Cotter. Pages 231, 5½ x 8½ in.; illustrated. Published by the Moody Magazine & Book Company, New York. Price $2.

Mr. Cotter, out of materials gathered from men prominent in the organization and conduct of the United States Steel Corporation and from the voluminous testimony given in the Government suit for the corporation's dissolution, has made a very interesting book. In his foreword he admits a prejudice in favor of the corporation and expresses the belief that its organization marked the dawn of a new and better era in industrial history. There are no new revelations, but more facts of popular interest about the world's greatest industrial consolidation are put in shape for ready consumption than have yet been set before the reader of a single volume. Mr. Cotter is not only partial to the corporation, but he presents friendly estimates of the men who promoted it and those now at the head of it. What he has gathered from documents and from newspaper and magazine articles of 14 or 15 years ago, has been checked up in part by conversations with Chairman Gary, President Farrell, C. M. Schwab, George W. Perkins and others. He took a trip of two weeks to some of the corporation's plants and on this bases a chapter on the "Spirit of the Corporation" as found in the ramifications of its organization. He finds the secret of the corporation spirit to be the square deal.

Among the numerous illustrations, most of which are full-page, are portraits of the heads of the corporation, views in the works, a number of illustrations secured at Gary and some typical pictures bearing on safety and welfare work.

The author gives a favorable view of all that has been done from the beginning, including the corporation's financing, the bond conversion scheme and the Hill ore purchase. Judge Gary, on the contrary, in comparing some of the early acts of the corporation's directors with their later policies admitted frankly, when testifying in the Government suit, that they are probably better directors to-day than they were in the corporation's early years. The view taken in the chapter on the Hill ore purchase is that the sole object of those responsible for it was to secure adequate ore reserves for the future. Differing somewhat from opinions developed by the corporation's attorneys in the Government suit, the book expresses the opinion that "it is doubtful if, outside of the Hill holdings, a large enough reserve of commercially available ore is to be obtained in the United States." While "large enough" is rather indefinite, it may be recalled in this connection that the Steel Corporation's experts in the steel suit testified that almost limitless supplies of ores are available for existing independent steel companies or for other steel companies that may yet be organized.

Mr. Cotter has made good use of his material. In general, his view of the Steel Corporation is the common one and the justified one, that it has been of vast service to the steel industry and to the country. If its promoters had a large sense of power and of opportunity for profit, those who have come after them have developed instead a large capacity for service and a large appreciation of their responsibilities. They have contributed in no small way to the making of the new standards of corporation morals.

Autogenous Welding and Cutting. By Theodore Kautny, translated by the author and James F. Whiteford. Pages XIV + 157; 5¼ x 7¾ in.; illustrations, 134. Published by the McGraw-Hill Book Company, Inc., New York. Price, $1.

To a field in practical engineering that is daily becoming of greater importance, this volume in terse and simple language and without useless technicalities, will be a welcome addition. For those engaged in using the welding and cutting flames, it is full of valuable matter, comprehensively treated and gathered by the author from instruction recently standard at the technical high schools in Germany. It discusses the welding flame, gas manufacture, apparatus, installation, welding burner, cutting burner, autogenous welding of iron, repair of gray cast iron, welding of sheet iron, boiler repairing, manufacture of cylindrical and rectangular vessels, making and installing large pipes, also water and gas pipes and pipe-shaped apparatus, the welding of copper, aluminum, etc. In its treatment of the metallurgical side of the business it is especially thorough and instructive.

The text is compact. One chapter of only four pages gives the data for installing and maintaining the gas main and fittings for piping an autogenous welding shop. The illustrations of castings repaired by welding are not convincing; but those of the welding seam in all its phases are excellent. All men in this field will find the book well worth reading, and the rule-of-thumb workman who reads it should add materially to the output and the quality of his work.

Credit, Its Principles and Practice. By Benjamin H. Blanton. Pages 319, 6 x 8½ in. Published by the Ronald Press Company, 20 Vesey Street, New York. Price $2, postpaid.

The author admits that no set of rules can be devised to apply equally to all classes of credit inasmuch as judgment plays a large part in these matters, but he has set forth the underlying principles in a clear and interesting manner. He gives a summation of twenty years' experience in the credit office which should be of value to those who have been long engaged in such work, as well as to those who have not progressed far into the subject. The work is subdivided into these parts: Credit Office Routine, Credit Information and Protection, the Collection Department, Insolvency, and an appendix covering reports and statements of various kinds, blank forms, etc. Except for the chapter on insolvency the book is free from legal technicalities. The subject of insolvency is comprehensively treated. Taken as a whole, the book demonstrates the extent to which modern credit systems have been placed on a scientific basis.

Industrial Uses of Fuel Oil. By F. B. Dunn. Pages 235, 5¼ x 8½ in.; figures, 109. Published by the Technical Publishing Company, 618 Mission Street, San Francisco. Price $3.

The high price of coal and the low price of fuel oil developed in the Southwest and on the Pacific coast numerous uses for the latter grade of fuel. It was not long before manufacturers in other parts of the country found that its convenient methods of handling and regulating made it ideal for many manufacturing operations so that its use has spread rapidly through the country, and we find it employed in a wide variety of operations. The increased consumption began to react on the price. Three or four years ago the cost of this fuel in the East reached a point where the large users found it necessary to go slowly on new installations. This checked the consumption and at the same time the oil companies found better means of extracting the lighter products so that they were able to reduce the price on fuel oil. In the last year, however, demands again reached such proportions that the price of fuel oil rose rapidly, and many firms that have large oil-burning appliances are confronted with the necessity of changing over to another fuel. This is particularly true in the steel industries, where many open-hearth furnaces are being fired with fuel oil, using from 5000 to 8000 gal. per furnace per day, and even with the high price they have met difficulties in getting an adequate supply.

Fuel oil has never been sold cheaply enough in the East to find much demand for boiler house use, but in marine work its great advantages over coal, due to small weight and bulk, have given it a steadily increasing field; and in miscellaneous industries where the consumption of fuel is small and the advantage of controlling oil-fired furnaces is great, its use is still being extended. In the oil-producing localities and locations where coal is very high priced, they are finding fuel oil indispensable. Along the Pacific coast fuel oil is in general use for almost every kind of furnace appliance, including boiler houses, and is found in common use for heating residences.

To a person unfamiliar with this subject, the book will be found very interesting, as the numerous illustrations and tables outline very completely the wide use of this fuel. Most of the matter found in this book has been covered in the various technical magazines, however, and the well informed fuel engineer will find little in it that he is not already familiar with, but he may be glad to secure the book as a handy reference on this subject.

IRON-SILICON ALLOYS

When Melted in a Vacuum They Show Remarkable Magnetic Properties

A number of iron-silicon alloys, melted in vacuo, is described by T. D. Yensen, assistant professor of electrical engineering, University of Illinois, Urbana, Ill., in a paper presented at the meeting now in session of the American Institute of Mining Engineers in New York. The methods employed in producing these alloys are given as well as the mechanical and electrical tests to which he subjected them. The summary and conclusions arrived at are as follows:

1. By means of the vacuum method of melting it is possible to obtain a decidedly purer product than has thus far been obtained in any other manner. Consequently by the use of this method more definite conclusions than have hitherto been possible can be drawn with regard to the effect of silicon upon iron.

2. Silicon, like boron, has a double effect upon iron. Part of it combines with the iron and remains in solid solution throughout the cooling of the alloy, while a smaller part reduces the iron oxide present.

3. The tensile strength of the vacuum product follows in general the same law as alloys made under ordinary conditions, but the ductility of the former is much greater, particularly below 2 per cent and above 3 per cent, probably due to the absence of carbon. The maximum tensile strength of 105,000 lb. per sq. in. (73.5 kg. per sq. mm.) occurs with a silicon content of 4.5 per cent.

4. The limit of forgeability lies between 7 and 8 per cent silicon. A critical range occurs between 2.50 and 2.60 per cent, in which the alloys are exceedingly brittle, in some cases being not even forgeable. The chemical composition of the latter corresponds to a compound of the formula $Fe_{15}Si$.

5. With regard to the magnetic properties, the vacuum alloys exhibit most remarkable characteristics. The best alloys are obtained with about 0.15 per cent and 3.40 per cent silicon after annealing at 1100 deg. C. The maximum permeability for both of these alloys is above 50,000, and the hysteresis loss for $B_{max} = 10{,}000$ and 15,000 and is about 300 and 1000 ergs per cu. cm. per cycle respectively. This hysteresis loss is ⅛ and 1/3 of the corresponding loss for commercial silicon steel. The most favorable annealing temperature is in every case 1100 deg. C.

6. The specific electrical resistance increases about 13 microhms for the first per cent silicon added. For each additional per cent added the increase is about 11 microhms. Consequently the 3.40 per cent alloy mentioned under 5 has resistance nearly five times that of the 0.15 per cent alloy.

Table of Properties of the Two Best Iron-Silicon Vacuum Alloys

Silicon Content, Per Cent	Stress at Yield Point, Lb. Per Sq. In.	Ultimate Strength, Lb. Per Sq. In.	Elongation Per Cent	Reduction of Area Per Cent	Maximum Permeability	Density for Max. Permeability, Gausses	Hysteresis Loss, Ergs/c.c./Cycle: For $B_{max} =$ 10,000	Hysteresis Loss, Ergs/c.c./Cycle: For $B_{max} =$ 15,000	Spec. Elect. Resistance, Microhms
0.15	18,500	37,000	56	90.0	above 50,000	6,500	286[1]	916[2]	11.80
3.40	58,000	76,500	21	28.5	above 50,000	6,500	280[1]	1,025[2]	48.50

[1] From data recently obtained with rings these values may be 10 to 20 per cent low.
[2] From data recently obtained with rings these values may be 5 to 10 per cent high.

TWO UNUSUAL SILICON ALLOYS

By the vacuum process two silicon alloys have thus been produced that have very valuable characteristics; one low in silicon, not very strong, but extremely ductile, of high permeability, low hysteresis loss, and of low electrical resistance; the other high in silicon, very strong, moderately tough, of high permeability, low hysteresis loss and of high electrical resistance. The properties for these two alloys are summarized in the table 9. The first is evidently suitable for use in places where high permeability and low hysteresis loss are the chief requirements, while the second alloy is suitable for electromagnetic machinery, principally transformers, where a low eddy current loss is an additional requirement.

The mechanical properties of the second alloy make possible its use also in dynamo machinery, where the present commercial silicon steel cannot be used on account of its brittleness.

It should be pointed out that electrolytic iron is not essential to the attainment of high magnetic quality. Any low carbon iron that is practically free from phosphorus, sulphur and manganese, *when melted in vacuo*, will give magnetic properties approaching very closely to those obtainable with electrolytic iron. At the present time there are obtainable a number of commercial grades of iron that come within these specifications.

The author fully realizes the difficulties that have to be overcome before the vacuum iron can be used in the industries in competition with materials available at the present time. Suggestions have, nevertheless, already come from several sources for its employment in places where its high cost of production is not of vital importance, and there is no doubt but that its usefulness in limited fields will increase as time goes on. However, the author would like to suggest that the results here given be partly considered as a new indication of the possibilities obtainable in the realm of magnetic properties, rather than as the final word regarding certain properties of iron-silicon alloys that can be turned into commercial use at the present time.

Status of the Belgian Steel Industry

Recent reports of the Belgian iron industry state that at the blast furnaces of la Louvière 400 to 500 men are working daily except on Mondays and that in the structural works, Nicaise et Deluve, about one-half the usual force is employed. The structural plant at Bouvy and the Gilson rolling mills are said to be fully occupied, while the rolling mills of La Croyère, idle since the war started, have been reopened and the blast furnaces of Thiriau have been working uninterruptedly for the last 15 months. The blast furnaces of Haine Saint-Pierre work about three days a week, while the Baume rolling mills have closed down temporarily. The steel plants of Ougrée-Marihaye, Sambre et Moselle and Providence are working on a restricted scale. Most of the Belgian steel works are said to have closed their business year with considerable losses, attributed in part to large sums spent for the relief of distressed workmen.

At the annual meeting of the Fairbanks Steam Shovel Company, Marion, Ohio, held Feb. 1, officers were elected as follows: James G. Fairbanks, president and general manager; O. P. Lennox, vice-president; Charles W. Fairbanks, secretary and treasurer.

The Crucible Steel Casting Company, Lima, Ohio, has about completed a plant addition, which it will occupy within the next two weeks. The new building is 80 x 160 ft.

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Steel for the Last Half

The United States Steel Corporation's figures showing unfilled orders amounting to 7,922,000 tons on Jan. 31, or an increase of only 116,000 tons in January, have been commented on as at variance with recent statements as to the extent to which the large steel companies are sold ahead. Commonly, representatives of these companies say that they have little to offer in heavy products for delivery this year. A number of them seem to be about as well sold up on wire, sheets and tin plates. The Steel Corporation had roundly 8,000,000 tons of unfilled contracts at the end of the first month of the year. Assuming, as is not the case, that these could be applied consecutively against finishing capacity, the latter would be wholly taken up to the middle of August, on the supposition that the corporation now has a capacity of about 15,000,000 tons in finished products and in semi-finished steel for sale. Its largest production for a year was 12,506,000 tons of such products in 1912. The total for 1913 was 12,375,000 tons. In neither of those years was full capacity reached.

The point is that the Steel Corporation's capacity for production in 1916 after Feb. 1 is upward of 13,500,000 tons, or 5,500,000 tons more than the total of unfilled orders. It is known that orders booked in the first half of February were 400,000 to 500,000 tons more than shipments. Thus on the face of the statistics there would be 5,000,000 tons of capacity still open in 1916. Against this should be set a tonnage of unknown amount representing reservations for customers who have been assured they would be taken care of in the second half, but whose needs have not been set down in definite tonnages at definite prices. Some allowance should also be made for what the Steel Corporation has always done in setting aside a certain portion of its output for the foreign trade.

The situation this year is perplexing beyond any precedent, both for sellers and buyers. Prices on contract material have been pulled up by war demand to a level unknown to the present generation of steel masters. Some consumers, as has been said frequently in market reports, have asked for assurance that they will be taken care of in the second half, saying that the price is immaterial in comparison with the certainty that they will have sufficient steel to supply customers depending on them. On the other hand, are manufacturing consumers in trades in which the present high prices are operating to reduce consumption. A striking example in the steel trade itself was the decision of a Central Western steel company last week to defer the building of a blast furnace because bids on the plate and other construction work indicated a cost of $200,000 more than the original estimates. Boiler manufacturers have pointed out that in their trade present prices for plates are causing some curtailment.

There are evident differences in the selling policies of large steel companies. Some have gone to the limit, and possibly beyond, in the amount of war steel they could safely book for delivery this year in view of the probable demands of regular customers at home. When it is said, therefore, that leading steel companies are just now reluctant to sell more steel for delivery in the third and particularly in the fourth quarter, it is implied that what is already sold, together with the demands of the foreign trade and of customers at home, will take up all that can be turned out in finished form this year. It is certain that much more war steel is yet to be placed for delivery in 1916, and in view of the profits such business yields all the steel companies apparently are holding some space against such demand.

What has caused concern to some consumers is the fact that for several months they have not been able to get full deliveries on their contracts and that when they try to cover for the remainder of the year, are asked to cut down the amounts for which they want to contract. That some of these consumers have reason to complain because deliveries on their low-priced contracts have had to stand aside for higher-priced export business can hardly be gainsaid. It must be said, however, that if the history were traced back far enough there would be found records of refusals to specify when the market had gone down, and that these had not been forgotten by the steel makers.

The situation presents difficulties from the standpoint of both buyer and seller, in view of the extremely high prices and the heavy overhanging war demand, which will tax every resource of the trade, mentally and physically. They must be considered as part of the price American consumers of steel, and makers as well, must pay for the war.

The Banner Export Year

Veterans in the trade will experience a thrill of exultation when they read the total figures of our iron and steel exports in 1915. Elsewhere in this issue will be found the details of the year's movement, including machinery, as furnished by the Bureau of Foreign and Domestic Commerce, Department of Commerce. As shown in the statement thus presented, 1915 was the banner year in shipments of iron and steel to foreign countries. The total exports of commodities for which the weight is given, and therefore commonly called "tonnage exports," were 3,513,453 gross tons, against 1,549,554 tons in 1914, and 2,947,596 tons in 1912, when the last previous record was made. The gain over the best preceding year was therefore 565,857 tons, or almost 20 per cent. If it were possible to secure and include with these figures the weight of locomotives, machine tools and other machinery and apparatus exported, and which European countries include in their export tonnage tabulations, the gain over 1912 would be very much greater. It is noteworthy that 1915 was the first year in which our tonnage exports ran over three millions. For the purpose of comparison the figures of such exports back to 1900 are given herewith:

Tonnage Exports of Iron and Steel—1900 to 1915

Calendar Years	Gross Tons	Calendar Years	Gross Tons
1915	3,513,453	1907	1,301,979
1914	1,549,554	1906	1,325,740
1913	2,745,635	1905	1,009,243
1912	2,947,596	1904	1,167,710
1911	2,187,725	1903	326,590
1910	1,537,943	1902	372,399
1909	1,239,709	1901	700,857
1908	964,242	1900	1,154,284

It will be seen from this table that our export trade in the commodities covered—steel rails, bars, billets, rods, shapes, plates, sheets, pipe, nails, wire, pig iron, etc.—has varied considerably from year to year. It rarely approached a million tons until after 1900, and even then the movement abroad was comparatively insignificant until the United States Steel Corporation began to lay the foundation for the steady flow of a portion of its various products into foreign markets. The enterprise of that corporation's export branch is largely responsible for the growth shown in the foregoing tabulation in the past ten years. While our great increase in exports in the past year may be attributed in considerable part to conditions connected with or arising from the European war, it is undoubtedly true that but for the connections previously made by the export department of the corporation the growth of the movement would not have been so great. Other iron and steel manufacturers have hitherto given but desultory attention to foreign trade instead of the systematic cultivation which is necessary for its establishment and retention.

The figures attained in 1915 have made this country rank at last with Great Britain and Germany as sources of supply for outside markets. As far as these figures have been swollen by the war demand they can of course be expected to shrink after the war ends. Their further shrinkage will then depend upon the efforts put forth by Germany and Great Britain to regain the trade lost because of their almost exclusive devotion to the production of war munitions and material. Those efforts, it may well be assumed, will be aggressive and comprehensive.

Steel and Raw Material Prices

Attention is being given to the fact that while finished steel prices have continued to advance up to this date, the pig-iron and scrap markets have not only advanced in the past three or four weeks but have even given some slight indications of weakness. Southern pig iron is not maintaining its recent strength and there have been slight declines in quotations on Bessemer and basic iron in the Valley districts. Other descriptions of pig iron appear to be barely holding their own. Heavy melting steel is off only a shade in the Eastern market, but at Pittsburgh and Chicago the declines are between 50 cents and $1 per ton.

The question is naturally asked whether such behavior on the part of scrap and pig iron is consistent with continually stiffening prices for finished steel products. Are there precedents for such divergences? It is an easy matter to scan history for possible precedents, for, as is well known, prices of finished steel products have always advanced in grand swings. During periods of low prices there may be minor advances and declines, but after the finished steel market gets in full swing it does nothing but advance until it is ready for a correspondingly long swing in the other direction. In looking for a possible precedent to present conditions, therefore, it is merely necessary to observe whether there have been declines in scrap and pig iron during the great steel price movements of the past dozen years.

In the case of pig iron there is no precedent in the 1912-13 or the 1909-10 movement. In the first six months of 1905 there was a rather noteworthy decline in pig iron in practically all markets, though at the same time steel products were gaining somewhat in strength. A careful study of the situation, however, suggests the theory that the advancing movement of the closing months of 1904 was carried too far, producing a top-heavy market. Thus it may be said that no clear precedent has been found, but in noting this fact it must be borne in mind that it is by no means established that a pig-iron decline is now in progress. All that is proved to date is that the pig-iron market is not the one-sided affair that characterized its course in the past six months of 1915.

In the case of scrap one finds that in the 1912-13 and 1909-10 movements there was practically no room for a recession in price and then a recovery. The highest point in scrap prices was found rather early in each movement, a characteristic thing with the scrap market, when the mills are speeding up in consumption and the outcome of old material increases somewhat tardily. It is noteworthy that these high points occurred in each case just before winter, something also in keeping with the nature of the trade.

In the preceding period of great steel activity, 1905-6-7, scrap did experience a very pronounced recession with a later and complete recovery. In December, 1905, heavy melting steel scrap sold at

$18, delivered Pittsburgh, while in the following April sales were made at less than $15, but the year closed with sales as high as $20. It may be noted also that the market advanced sharply in the last two months of 1904, undergoing a reaction which covered the entire first half of 1905. Thus there is a well-marked precedent for steel scrap declining, and then recovering, during a period of continued strength in the finished steel market.

The suggestion has been made that the relative weakness of heavy melting steel scrap may be due to the great amount of cropping practiced in the production of war steel, but such an explanation hardly bears the test of the calendar, for the great increase in the production of such steel occurred either during the time in which the scrap market was advancing so sharply, or in a still earlier period.

Unless a very considerable decline should occur in the scrap market, it would probably be entirely rational to ascribe the entire movement, the continued and marked advance, with a moderate reaction, to the circumstances surrounding this market, which is distinctly one of barter, and which permits the accumulation of considerable material in first hands. Naturally there are distinctly marked buying movements, and recessions between movements are natural. As a rule such recessions are encouraged by scrap dealers, who naturally welcome a chance to cover when they have sold material for delivery over a period of 60 or 90 days. At various mining and other operations crap accumulates when bid prices are low, the holder frequently fixing a price to which the market must advance before he will consider selling. Probably a considerable tonnage of such accumulated material is now reaching the consumers.

The future of the scrap market is fraught with interesting possibilities. The suggestion so often made by the scrap dealer, that when the steel mills are pushed for greater output they must use scrap, is not fully borne out by events. One thing they really do is to turn more to duplexing, while disposed to use the straight open-hearth process, with blowing vessels idle, when the demand for steel is light. The proportion of duplex steel produced dropped in a remarkable manner from 1913 to 1914. With the duplex process they may use scrap or do without it, according to the cost. The proportion of open-hearth capacity equipped with duplexing equipment is being very materially increased, particularly by the new construction at South Chicago and Gary. The amount of scrap called for by the steel industry six or nine months hence may be determined largely by the quantity of pig iron available, rather than by the precise nature of the steel works equipment.

It is interesting to reflect what a change would be effected in the situation should the sound steel ingot, so long sought, become the rule in steel works. Year by year the production statistics have shown that the weight of rolled steel produced is almost precisely 76 per cent of the weight of steel ingots cast, the rolled steel being weighed in the form of rails, structural shapes, plates, wire rods, skelp, sheets, etc., all sheared in marketable form. Of course scale is produced, as well as shearings at the final stage and at some intermediate points, but a large part of the steel that disappears is due to the ingot not being sound throughout its length, the loss on this account being probably fully one-half the total scrap loss. The sound ingot would therefore very greatly reduce the production of scrap. As the scrap produced in the steel mills greatly exceeds the scrap that is gathered from various points and shipped to them, the sound steel ingot would no doubt work quite a revolution in the scrap market.

"Industrial Democracy" at Pueblo

The Colorado Fuel and Iron Company is planning to carry out at its steel plant at Pueblo a system of industrial representation, so-called, paralleling that which was put into effect one year ago, on the suggestion of John D. Rockefeller, Jr., at its mining camps. Last month President Welborn appointed a "president's industrial representative" for the 10,000 employees at the blast furnaces, steel works and limestone quarries. Later the employees elected 30 representatives by secret ballot, and the latter on Jan. 26 met in conference 25 company representatives appointed by the president. If a plan similar to that which has been in operation at the mines is carried out at the steel works, as the result of a referendum decided on at this conference, there will be meetings of these 55 men at intervals of a few months, while machinery will be provided through department committees for considering at any time questions which may come up relating to working and living conditions. The employees will elect their representatives each year.

At the first steel works conference last month President Welborn made three important announcements: that an increase in wages would be made, similar to that recently effective at the large steel works of the country; that the company hereafter would give each employee a day of rest each week, and that the "long turn" in the change of shifts at the end of each week would be abolished. In telling what the company hoped for from the new plan, the president showed a spirit which promises much for success. But it is not overlooked in the company's bulletin, giving an account of these new developments, that the plan has many honest critics who regard it as paternalism and as doomed to failure. The company calls it "democracy in industry," and says that there is every evidence that its employees believe that a real partnership of the two interests is possible on a basis of friendship, mutual interest and fair dealing.

So far as the work at the Colorado Company's properties has gone, there are indications of success, to the extent at least of increasing the feeling of mutual interest and of breaking down the idea of an inherent antagonism between capital and labor. That would be more than justification for its continuance. The remoteness of the company's operations from other steel making centers should conduce to favorable results. One of the strongest features of the plan is the new sort of contact it provides between company executives and the men in the works. This emphasizes the fact that all are employees of the corporation and breaks down to a degree the military system, now too commonly prevalent in industry, that puts a premium on the superintendent's or foreman's ability to drive his men.

Empire and Thomas Options Were Not Exercised

Formal notification was given to the Thomas Iron Company in the past week that N. L. C. Kachelmacher of Logan, Ohio, and his associates would not exercise the option on the stock of that company taken in November, 1915, and which expired Feb. 11. The option taken by the same interests, represented by Messrs. Kachelmacher and Danforth, on the stock of the Empire Steel & Iron Company expired on Monday of this week, Feb. 14. Notice was given also to the Empire Company that the option would not be exercised. There have been intimations that important holders of Thomas Iron Company stock might proceed further with a deal looking ultimately to the building of a steel plant, but nothing definite in this direction has developed.

It is understood that some work is being done at Wharton, N. J., under the direction of the Kachelmacher and Danforth interests in view of the fact that their option on the Wharton Steel Company properties at $1,500,000 was exercised in January. The time within which the transfer of this property can be completed under the terms of the option has not yet expired.

The Steel Corporation's Unfilled Tonnage Nearly the Record

The United States Steel Corporation's monthly statement shows that the unfilled orders on its books Jan. 31, 1916, were 7,922,767 tons, against 7,806,220 tons on Dec. 31, 1915, a gain of 116,547 tons. This is the largest unfilled tonnage reported with one exception, December, 1912 (when it was 7,932,164 tons), since March, 1907; but at that time inter-company business was included. The following table shows the unfilled tonnage for each month, beginning Dec. 31, 1912:

Jan. 31, 1916	7,922,767	June 30, 1914	4,032,857
Dec. 31, 1915	7,806,220	May 31, 1914	3,998,160
Nov. 30, 1915	7,189,489	April 30, 1914	4,277,068
Oct. 31, 1915	6,165,452	March 31, 1914	4,653,825
Sept. 30, 1915	5,317,618	Feb. 28, 1914	5,026,440
Aug. 31, 1915	4,908,455	Jan. 31, 1914	4,613,680
July 31, 1915	4,928,540	Dec. 31, 1913	4,282,108
June 30, 1915	4,678,196	Nov. 30, 1913	4,396,347
May 31, 1915	4,264,598	Oct. 31, 1913	4,513,767
April 30, 1915	4,162,244	Sept. 30, 1913	5,003,785
March 31, 1915	4,255,749	Aug. 31, 1913	5,223,468
Feb. 28, 1915	4,345,374	July 31, 1913	5,399,356
Jan. 31, 1915	4,248,571	June 30, 1913	5,807,317
Dec. 31, 1914	3,836,643	May 31, 1913	6,324,322
Nov. 30, 1914	3,324,592	April 30, 1913	6,978,762
Oct. 31, 1914	3,461,097	March 31, 1913	7,468,956
Sept. 30, 1914	3,787,667	Feb. 28, 1913	7,656,714
Aug. 31, 1914	4,213,331	Jan. 31, 1913	7,827,368
July 31, 1914	4,158,589	Dec. 31, 1912	7,932,164

New Installations of Heroult Electric Furnaces

The United States Steel Corporation announced the granting of licenses for the building and operation of the following Heroult electric furnaces:

Alabama Power Company, Anniston, Ala., two 6-ton furnaces in addition to the one 6-ton already operating and manufacturing munitions.

Lebanon Steel Casting Company, Lebanon, Pa., one 2-ton furnace in addition to the 1-ton already operating and manufacturing steel castings.

Vulcan Crucible Steel Company, Pittsburgh, Pa., one 3-ton furnace.

Announcement of the sale of the old Watts steel plant at Middlesboro, Ky., by the Virginia Iron, Coal & Coke Company, to the Boston Iron Works, Baltimore, closes a chapter in eastern Kentucky industrial development by English capital which had a brilliant beginning. Constructed at a cost said to have been over a million dollars, it was operated but a few days when the Baring failure in England checked all Middlesboro enterprises. The plant will be dismantled and the material shipped to Baltimore.

The Midvale Acquisition of Cambria

The terms of the Midvale Steel & Ordnance Company's financing of the purchase of Cambria Steel Company stock at $81 a share are stated in a circular to stockholders, dated Feb. 11 and signed by William B. Dickinson, secretary. Stockholders of record Feb. 21 are entitled to subscribe to the $25,000,000 of new stock (500,000 shares at $50 par value) at $60 per share, to the extent of one-third the amount of stock they now hold. Payment for the new stock is to be made on or before March 13. As this $25,000,000 of new stock will exhaust the present authorized capital stock of the company, a stockholders' meeting will be held March 11 to vote on increasing the capital stock from $100,000,000 to $150,000,000. The $50,000,000 of 5 per cent bonds issued as part of the financing of the Cambria purchase are convertible into stock at the price of $100 for $50 par value of the stock. To satisfy the conversion privilege of the bonds 500,000 shares of the proposed new stock, at $50 a share, will be required and will be reserved from the new stock issue of $50,000,000, leaving $25,000,000 par value of unissued stock to meet possible future requirements.

No announcement concerning changes in the Cambria Steel Company organization will be made until after Feb. 19, when the time for accepting the Midvale offer of $81 a share for the stock expires.

The Midvale Steel & Ordnance Company, with the acquisition of the Cambria Steel Company, will have a pig-iron capacity somewhat less than that of the Jones & Laughlin Steel Company, with which it has been compared in some recent publications. That of the latter company is 1,750,000 tons a year from five Eliza furnaces and one Soho furnace in Pittsburgh, four furnaces at Aliquippa and the Kittanning, Pa., furnace recently leased to run on ferromanganese. The Midvale blast furnaces consist of eight at Johnstown and two Worth Brothers furnaces at Coatesville, Pa., where a third is projected. The steel ingot capacity of the Jones & Laughlin plants, with the employment of duplexing both at Pittsburgh and Aliquippa is in excess of 2,000,000 tons a year. The Cambria Steel Company's ingot capacity is about 1,500,000 tons a year, while that at Coatesville is upward of 300,000 tons. Considerable extensions of the latter are now under construction, however.

Bridgeport Metal Specialty Company Buys New Plant

The Bridgeport Metal Goods Mfg. Company, Bridgeport, Conn., has bought the property and equipment of the R. P. K. Company, which up to some months ago was in operation in a plant adjoining the works of the Bridgeport Metal Goods Mfg. Company. With the heavier machinery of the R. P. K. plant, the Bridgeport company's range of products has been materially increased in the heavier and larger sizes and in general terms the company regards its capacity as increased 100 per cent. The company works largely with nonferrous metals, producing articles, commonly under contract, from wire, rods and tubes. For advising customers of the possibilities of working up various articles, as to the method, desirability, quantities and costs, the company has organized a factory service board made up in part of the officers of the company, who are A. S. Lyhne, president; George E. Beers, vice-president, and H. K. Beach, secretary and treasurer. The company started in business about seven years ago and has made a specialty of precision work in articles made by stamping, drawing, wire forming and other operations, and the equipment includes automatic screw machinery and a plating department. The company contemplates erecting another factory building, probably in the early fall.

The Gehnrich Indirect Heat Oven Company, Brooklyn, N. Y., has received another contract for eight radiator type enameling ovens for the Stewart-Warner Speedometer Corporation, Chicago.

COOPERATION AT PUEBLO PLANT

Colorado Fuel & Iron Company's First Conference with Steel Works Employees

Industrial Bulletin No. 5 of the Colorado Fuel & Iron Company issued under date of Jan. 31 gives an account of the first conference held by President J. F. Welborn and other executive officers of the company with the representatives of its more than 10,000 steel works and quarry employees. This was held at Pueblo, Jan. 26, and was attended by thirty employees' representatives (elected by the men) from the Minnequa steel works and the limestone quarries operated by the company and by twenty-five company representatives.

President Welborn announced that the company would put into effect a time schedule giving every workman one day of rest each week except in cases of emergency and would do away with the "long turn" which has been common in the steel industry. He also confirmed a previous announcement that a new wage schedule was in preparation carrying increases corresponding to those recently granted by Eastern steel companies. Mr. Welborn reviewed the development of the industrial representation plan in effect at the company's mining camps and already partly in effect at the Minnequa steel works. He said that he had been connected with the company for over twenty-five years, his first employment being that of clerk at a very moderate salary. In these twenty-five years the company had been a financial success only for the officers and employees, who had regularly drawn their salaries and wages. On this point he said further:

> The wages of the workmen have been maintained on a parity with, and in some cases higher than, the wages paid by our competitors, yet those who have invested their money in the common stock of the Colorado Fuel & Iron Company have received but 8¼ per cent in dividends during over twenty-two years. One and one-fourth per cent of this was paid in 1893, 3½ per cent in 1901 and 3½ per cent in 1902. The amount of common stock outstanding is over $34,000,000.
>
> The amount of preferred stock is $2,000,000, on which cumulative dividends at 8 per cent per annum should be paid. Dividends on this stock are in arrears from Jan. 1, 1909.

Mr. Welborn expressed the belief that when capital endeavors to secure its labor at the lowest possible figure and as a natural result the workmen try to secure the highest possible compensation, both disregarding the economic and business conditions under which they are obliged to work, the result is apt to be a breach, or at any rate the development of contending sides. In conclusion he said:

> You were asked to come here and meet representatives of the company "for the purpose of discussing matters of mutual concern and considering means of more effective co-operation in maintaining fair and friendly relations." To avoid any possibility of misunderstanding I want to say that this meeting and your election which preceded it are both in entire harmony with the views of all of the representatives of the company that you see here, as well as other officials of the company who may be absent. It is not that we doubt the fair intentions of the superintendents in their dealing with the workmen, that we propose to discuss means of more effective co-operation, but that we believe that meeting in a more or less formal manner on a basis of equality for an exchange of views will be beneficial to all. Those representing the company feel that their work will even be simplified if they can discuss with you matters of particular interest to the workmen as a whole, whether such matters be initiated by the superintendents or by the workmen themselves.

Following Mr. Welborn's address there was a general discussion, participated in by employees' representatives and company officials. The conference closed with a luncheon served in the dining room of the steel works club house.

On Jan. 8 President Welborn announced the appointment of Harrington Shafer as president's industrial representative at the Minnequa steel works and the quarries, and on Jan. 11 the steel plant wage earners and the workmen at the quarries elected thirty employees' representatives. Thus these workers were put in substantially the same relation to the company as that occupied by the coal miners one year previous, when David Griffiths was appointed president's industrial representative and employees' representatives were elected at each mining camp.

The Bulletin has the following in its editorial referring to the new movement:

"This plan does not mean that discipline has been abandoned, but it does mean that arbitrary action which results in injustice is no longer possible. The rules adopted for the management of the business have been made known in accordance with the plan and cordially approved by the employees. Those who refuse to abide by the rules will, of course, be dismissed—not arbitrarily, because of violation of a rule, but in the interest of their fellow employees as well as of the industry.

"Every C. F. & I. employee now has an opportunity freely to take a part in shaping all that relates to his work and his living conditions. This company is squarely committed to democracy, as contrasted with paternalism, in all its relations with its employees."

Four Meetings on Management Problems

The problems of management are to be made the subject of a series of discussions in the next four meetings in New York City of the Efficiency Society. These are to have particular reference to the labor turnover and its cost. The first meeting will be held on the evening of Feb. 24 and will deal with employment, the selection of employees; when and how to get them.

The second meeting will be held on March 16, and the topic will be: "Training—What to Do with Employees After They Are Secured to Adapt Them to Their Work; Education; Specialization."

The third meeting will be held on April 20, and the topic will be: "Management—the Determination of Policies with Reference to Their Effect on the Employee; the Personal Element."

On May 18, the last of the series, the subject will be: "Compensation—The Proper Return to the Employee for His Efforts; Profit-sharing; Pension Systems."

The place of meeting has not yet been announced. The Efficiency Society headquarters are at 52 Broadway, New York. A. W. Kimber is secretary.

Pressed Steel Car Company in 1915

The Pressed Steel Car Company's report for 1915, presented at the annual meeting Feb. 16, shows that gross sales for the year were $17,492,621 and net profits $1,324,815. Out of this $875,000 was taken for dividends on the preferred stock, leaving the remainder for addition to the surplus account. President F. N. Hoffstot says that the company "began the year with less business on our books or in sight than any year in the history of the company and booked less domestic business during the first half of the year than during any other similar period. In the fourth quarter of the year a strong buying of cars began, which very soon slowed down, the principal reason for this being the advance in the price of raw materials, which largely increased the production cost." In but one year in the past ten, said he, have the railroads purchased their normal annual requirements of materials.

Annual Meeting of American Society for Testing Materials

The American Society for Testing Materials will hold its nineteenth annual meeting at Atlantic City, N. J., June 27 to July 1, inclusive, with headquarters at the Hotel Traymore.

Notwithstanding the increase in dues the resignations from membership in January, 1916, that is, since the beginning of the current fiscal year, have shown no significant increase. The total present membership, after deducting these resignations, is 1940, as compared with a total membership of 1842 reported at the last annual meeting.

Lackawanna Steel Earnings, 1915

Following is the comparative statement of income account of the Lackawanna Steel Company and subsidiaries for the year ended Dec. 31:

	1915	1914
Total net earnings after deducting expenses, including repairs and maintenance, but not renewal expenditures	$5,977,469.57	$1,581,378.46
Deduct:		
Interest on bonds, debentures and notes:		
Lackawanna Steel Company	1,633,283.34	1,749,700.00
Subsidiary companies	309,900.00	315,950.00
Rentals and royalties	101,536.00	101,536.00
Balance	$3,932,750.23	*585,807.54
Less appropriations:		
Extinguishment of mines and mining investments	313,114.79	226,848.47
Depreciation and accruing renewals	1,210,527.65	839,788.57
Profit for the year	$2,409,107.79	*$1,652,444.58

*Deficit.

The profit for the fourth quarter of 1915, after all deductions, was $1,795,758.13, which equals a rate of 20.66 per cent per annum on the outstanding stock. The rate of profit for the entire year was 6.93 per cent. Unfilled orders, Dec. 31, 1915, were 812,680 tons, against 160,160 tons at the close of 1914.

Holders of the company's 6 per cent two-year gold notes, due March 1, 1917, have been notified that the entire issue ($6,000,000) will be redeemed and paid March 31, 1916, at the National City Bank, New York, at 101 per cent of their face value and interest accrued to that date.

Railroad Car Business

Railroad car buying is without color at the moment, but an interesting note on the future is contained in the report of President F. N. Hoffstot of the Pressed Steel Car Company given out Feb. 16. He counts on the railroad companies now emerging from receiverships as likely to make early provisions for the purchase of additional equipment and expects that the defense preparedness campaign now before the country, necessitating the construction of a larger navy and better army facilities, will in itself increase demands on manufacturers and the railroads to such an extent as to bring about increased demands for railroad equipment.

Orders have been placed by the Southern Pacific for 1000 box and 250 gondolas, to be built by the Haskell & Barker Car Company and for 2300 cars and 275 car bodies to be built by the Ralston Car Company. The Lackawanna has bought 1400 coal cars divided equally between the Standard Steel Car Company and the American Car & Foundry Company. There are now hardly 6000 cars actively before the market, including 300 stock cars for the Denver & Salt Lake and 900 cars for the Atlantic Coast line, not heretofore mentioned in these columns. It is rumored that the Chicago & Northwestern may buy 5000 cars.

The Newport Rolling Mill Company, Newport, Ky., gave a dinner on Tuesday evening, Feb. 8, to about 40 of the men connected with its plant and with allied interests. The function was held in the dining room of the company's office building. After the dinner Frank A. Moeschl, general manager of sales, stated that the purpose of the meeting was to get the employees in different departments more closely aligned, as well as to show, in a measure, how much the company appreciates the hearty co-operation of its employees. It is the purpose of the company to hold these informal sessions once every two months. A theater party at Keith's in Cincinnati followed adjournment.

Eastern Pennsylvania blast furnaces have practically concluded their contracts for mill cinder and puddling scale for delivery throughout this year. The prices were higher by about $1.50 than those paid a year ago. Mill cinder brought about $3.50 to $3.75 per ton, delivered, against $2 to $2.25 a year ago, and puddling and heating scale $5 to $5.50 per ton, against $3.50 to $4.

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NITRIC ACID FROM THE AIR

America Not Unprepared—Germany's Great Achievements

"Electrochemical War Supplies" was discussed before a very large gathering of electrochemists and chemical engineers at a joint meeting of the American Electrochemical Society, American Chemical Society and Society of Chemical Industry at the Chemists Club, 52 East Forty-first Street, New York, Friday evening, Feb. 11. The record attendance revealed the widespread interest in this subject, Rumford Hall being crowded as never before. W. H. Saunders, president American Institute of Mining Engineers, was the first speaker. He emphasized the importance of industrial preparedness, regarding it as more essential than even military or naval preparedness. He spoke of coal consumption as the real test of a nation's industrial greatness and showed how that of the United States was 5 tons per capita per year, while that of England and Germany was 4 tons each. Contrasted with these three great nations he cited France with a coal consumption of only 1.6 tons per capita per year and Russia with a consumption of only 0.25 ton.

The brief and highly important paper on "Air Saltpeter" by W. S. Landis, chemical technologist of the American Cyanamid Company, revealed facts that were startling to many of his hearers. Prefacing his remarks with the statement that many reports regarding Germany's preparedness before the war were erroneous and that even our own preparedness was underrated, he said that Germany, when the war started, had only three plants making cyanamid with an output of 50,000 tons per year, that no arc process for nitrogen fixation was in existence and that there were no nitrogen fixation plants of any kind.

To-day, said Mr. Landis, Germany has plants making 600,000 tons of cyanamid per year and also one plant for fixing nitrogen by the arc process producing 10,000 tons of nitric acid per year. To do this about $100,000,000 had been invested, but under an initial cost and industrial pressure and strain that were very great. Before the war Germany imported 850 000 tons of sodium nitrate, 3000 tons of calcium nitrate and 20,000 tons of other nitrates for industrial and agricultural purposes. To-day she is making in her new plants 250,000 to 300 000 tons of nitric acid per year for war and industrial purposes. These industrial strides had been accomplished in 18 months.

In Canada, Mr. Landis added, under the direction of American men, cyanamid is being successfully made by a simpler type of apparatus than the German. It would take but a short time to make nitric acid by this method in the United States, as all the details of the process are known to American electrochemists. General conditions for its quick manufacture are good, even better than they were in Germany.

"New War Products" was discussed by Albert H. Hooker, president Hooker Electrochemical Company, who spoke in particular of the extensive line of electrochemical products made in the Niagara Falls district, such as ferrosilicon, ferromanganese, ferrochromium, ferrotungsten, calcium carbide, cyanides, chlorine and others, nearly all essential directly or indirectly to war supplies. Mr. Hooker emphasized the fact that more electrochemists are employed in the Niagara district than at any other place in the world.

Many unusually interesting facts regarding the development of a new American industry, the manufacture of metallic magnesium, as well as the importance of the metal now and its future possibilities, were presented by Dr. William H. Grosvenor, a consulting chemist of New York, in a valuable paper entitled "Magnesium," which is published elsewhere in this issue, practically in full.

The strike in the shop of the Urbana Tool & Die Company, Urbana, Ohio, has been called off. It lasted a little over two weeks. The strikers returned to work without securing any of the concessions they demanded, namely, an 8-hr. day, 50c. per hour, and a closed shop.

The Proposed Government Armor Plant

WASHINGTON, D. C., Feb. 15, 1916.—In accordance with the decision of the Senate Naval Committee, reached Feb. 8, ordering a favorable report on the bill appropriating $11,000,000 for a Government armor factory, Chairman Tillman has presented the measure in the Senate and to-day called up the bill. Owing to the absence of Senator Penrose and the desire of several Senators to speak against it, no action was taken and the measure was returned to its place on the Senate calendar. It will probably be called up again in a few days, but in view of the opposition that has developed it is not likely that a vote will be taken for some time.

Aside from the unwisdom of embarking the Government in the business of making armor plate, conservative Senators are examining carefully the suggestion put forward by the armor manufacturers during the recent hearings that it would be difficult to choose a more unfavorable time than the present to undertake the erection of such an expensive factory. With a runaway market for iron and steel, and with manufacturers of all kinds of material and equipment refusing contracts at any price conditional upon deliveries in the near future, it is the opinion of the most competent authorities that it is not possible to build a 20,000-ton armor plant for anything like the amount carried by the bill and that, compared with construction under normal conditions, from one-third to one-half of the money spent on contracts made at this time will be thrown away.

No one here is giving serious attention to Senator Tillman's threat that if the armor plate manufacturers undertake the amortization of their plants, by raising the price of the armor delivered during the interval before the Government factory is ready for production, the plants will be seized under an exercise of the right of eminent domain. This is not a new suggestion, but no one here expects that any attempt will be made to carry out Senator Tillman's threat. W. L. C.

Lectures on Military Engineering

The free courses of lectures on military engineering which began on Monday evening, Feb. 14, at the Engineering Societies Building, New York City, brought a response from those likely to be interested that was three or four times greater than expected by the committee of the four national engineering societies which arranged for the course. Besides filling the main auditorium of the building, the next largest meeting room of the building was filled with an overflow session conducted at the same time.

The first lecture was general in its scope, outlining how every branch of engineering is brought into play in army campaigns and sea coast defense work and made it clear that opportunities for service exist not only with those not physically fit for the exactions of active army movements but for those beyond the so-called age limit, who may serve in the coast defense work. Another of the points brought out was the great need for those with engineering education and experience for the non-commissioned as well as commissioned staff of the engineering battalions. The course of lectures is regarded as preliminary to a course of training at a summer camp, such as was conducted at Plattsburg, N. Y., last year, that is, for those who desire to prepare themselves for immediate service in the emergency. Incidentally, the lecturer, Capt. Thomas M. Robins, Corps of Engineers, U. S. A., always referred to the possibility of war as a definite certainty. There are six more lectures, to be given on Monday nights, as announced on page 364 of the issue of Feb. 10.

Heinrich J. Freyn, Inc., engineer, 530 People's Gas Building, Chicago, has recently taken contracts for the installation of a 60,000-cu. ft. Brassert-Bacon gas washing and drying unit for the Struthers Furnace Company, Struthers, Ohio, and a similar unit of 50,000 cu. ft. capacity for the Mississippi Valley Iron Company, St. Louis, successor to the St. Louis Blast Furnace Company.

Boston Engineers Banquet

The Part of the Engineer in National Plans for Defense a Feature

The seventh annual banquet of the Boston members of the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the Boston Society of Civil Engineers was held at the Boston City Club Feb. 8. Over 400 attended, more than double the number at previous dinners. The first speaker was Gov. Samuel W. McCall of Massachusetts, who chose for his subject "The Engineer and the Commonwealth." He believed engineers were the ones to improve conditions which prevailed in some of the administrations of government. He showed how by continuing to make laws and appoint commissions the State had arrived at a point where it had 107 different commissions and departments, overlapping in their duties and making an enormous duplication of work and expense.

Col. W. E. Craighill, U. S. A., spoke on "Engineers in National Defense" and outlined the plan of the army for an engineer reserve corps. He brought out the part which the engineers would play in preparing for the defense of Boston, according to plans already made. One hundred miles of trenches would have to be built around Boston in ten days, requiring the services of 25,000 men and costing $2,000,000.

A more precise statement of the part which the engineers would have in a preparedness campaign was made by William Barclay Parsons, consulting engineer of New York City, who had for his subject, "Engineers in National Defense—A Second Viewpoint." His address covered the work to which the engineers would be assigned in detail and told of the training which the volunteers would receive. His address aroused great enthusiasm.

Dr. John A. Brashear, of Pittsburgh, took the audience in his inimitable way on "An Evening's Journey Among the Stars."

John R. Freeman, a member of the government commission to study the recent slides in the Panama Canal, outlined the work which remained to be done before the canal would be permanently open for navigation. He also spoke of the advantages of military training as he had observed them in France and Germany, and expressed the hope that the time would come when every young man would have at least one year of military training.

Calvin W. Rice, secretary of the American Society of Mechanical Engineers, spoke on the engineer reserve corps.

Charles L. Edgar, president of the Edison Electric Illuminating Company, Boston, was toastmaster, and Arthur L. Williston, Wentworth Institute, was chairman of the joint committee of arrangements.

The Packard Motor Car Company, Detroit, Mich., has announced that it will pay the fees required of any of its alien employees who may desire to take out first papers toward American citizenship. This follows the announcement made Jan. 31 that only American citizens, or those of foreign birth who have relinquished their foreign citizenship and who have filed their applications for citizenship, will be given promotions to positions of importance, and that loyalty to the United States is a pre-requisite to employment. Practically every man of foreign birth who stands in the line of men to be seen any day seeking employment at the Packard plant has his first papers tightly clutched in his hand. Alvan Macauley, vice-president and general manager of the Packard Company, has received an avalanche of letters indorsing his stand for "Americans First." Many manufacturers have informed him that they have adopted the same policy.

A benzol plant will be erected by the United Furnace Company, Canton, Ohio, which is now building a blast furnace and coke ovens. This was authorized at the annual meeting on Tuesday, Feb. 15. The contract will be placed shortly.

Milwaukee Metal Trades Annual

William W. Coleman, president Bucyrus Company, South Milwaukee, Wis., was elected president of the Milwaukee Metal Trades and Founders' Association at the annual meeting Feb. 10. Richard P. Tell, vice-president and general manager National Brake & Electric Company, was elected vice-president. William J. Fairbairn, for many years the efficient secretary and manager of the association, was re-elected. The First Trust Company will again act as treasurer.

H. H. Rice, Indianapolis, president National Metal Trades Association, was the guest of honor at the banquet which followed the annual meeting. Discussing the present unusual conditions in the labor field, he made a plea to employers to deal fairly with their men, particularly at this time, when the business of the metal trades is of such volume as to require the employment of practically the available supply of labor. Said Mr. Rice in part: "Labor trouble struck the East like an epidemic or rather hysteria. In cases where we believed the payroll was fair and equitable, we advised employers to sit tight; to make no concessions because to do so was to court further trouble. If you are not dealing fairly with your men, you should do so or you ought to be made to do so. Where you are dealing fairly with the men and a strike is threatened, take no action hurriedly. Employers who have not changed their payrolls should look into the question. Workmen are entitled to their share as the market demand dictates, and the employer who is not fair in his treatment of his men is only plowing ground for the agitator."

Addresses were also made by Dr. G. A. Bading, mayor of Milwaukee; Milton C. Potter, superintendent of schools, and the Rev. Dr. W. T. Dorward, Milwaukee, who was elected honorary chaplain of the association two years ago.

Marshall Foundry Buys Bollinger-Andrews Foundry

Negotiations have been closed by which the Marshall Foundry Company, Pittsburgh, maker of ingot molds and heavy castings, has bought the ingot mold plant of the Bollinger-Andrews Company, Josephine, Pa. This plant was erected in 1914, and located at Josephine so that hot metal could be used direct from the furnace of Corrigan, McKinney & Co. However, the company did not use hot metal, but used the cupola process, and its output of ingot molds amounted to about 150 tons per day. The plant has two cupolas and is equipped with one 30-ton and two 20-ton electric cranes.

The new owner will make some minor changes about the plant, and intends to use hot metal from Josephine furnace as soon as arrangements can be made. It expects to increase the output of ingot molds per day to 300 tons, and the company makes in its Pittsburgh foundry about 200 tons, so that it will have a combined daily capacity at both plants for making about 500 tons.

The Bollinger-Andrews Company continues to operate a structural steel fabricating plant at Verona, Pa., near Pittsburgh.

The Warren Foundry & Machine Company held its annual meeting at Phillipsburg, N. J., Feb. 14. Officers were re-elected as follows: William H. Hulick, president and treasurer; A. D. Chidsey, vice-president; A. L. Reiley, secretary. The directors were re-elected with the exception of A. S. Riegel and James Ingham, who declined to serve because of other pressing interests, and whose places were filled by the election of W. H. Walters and Lee Clymer.

The Allied Machinery Company of America, which has been located for several years in the National City Bank Building, 55 Wall Street, New York, has removed to 120 Broadway, where it occupies offices on the thirty-seventh floor.

Iron and Steel Markets

NO END TO THE DEMAND

Implement Manufacturers Covered

Price Advances in Numerous Lines—Large Increase for General Export Expected

With further price advances, and the end not yet in sight, withdrawals and postponement of new steel-taking projects occur, but they are as nothing in comparison with the avalanche of inquiries which are expected in early weeks from non-belligerent nations. The vague and general feelers from these sources are fast giving way to requests specific as to kind, amount and delivery. They come from quarters which have been waiting, for one reason and another, until the war should close, and their needs are urgent. The peace and war demands from the outside thus are calculated to keep the mills busy if domestic consumers are not willing to pay present high prices. There are numbers who have counted on softer prices in the last part of the year, but the trend of recent weeks has convinced some large consumers they have overstayed.

In sharp contrast is the attitude of the large agricultural implement manufacturers who have already secured mill space for their buying year beginning July 1. Usually the negotiations have been instituted at a much later date and have been protracted. This year, with a possible exception, the contracts cover only the period to Jan. 1, 1917. This has been done in the face of the disinclination of mills to consider future contracts, yet the pressure has been sufficiently great that one Middle West interest last week took 120,000 tons under contract.

The grouping of large independent steel companies—like the Midvale-Worth Brothers-Cambria merger and the Bethlehem-Pennsylvania union—is of no effect at the moment on market conditions but it is of course recognized that over three-quarters of the steel making capacity of the country will be lodged with six or seven companies. This does not warrant, however, the expectation that in slack times competition will be any the less severe.

There are signs that a long practice of modified rules on transportation by railroads of material for export may have a permanent effect. This may not result in higher cost to the shipper, though he now temporarily bills his products as domestic business and at domestic rates, in order to get around the embargoes, but will doubtless work toward quicker handling of shipments at destination terminals and a better utilization of railroad cars.

The resistance of the mills to new commitments is allowing one or two to catch up slightly but only slightly, while specifications on contracts are far beyond pro rata amounts and shipments on them way under. There is no gainsaying that domestic consumers are suspicious that lucrative war orders are responsible, though they were wofully late in coming into the market. The fact remains that the larger mills at least have taken care that their year-in and year-out customers will get what has already been bought, and as promptly as influences beyond their control will allow.

Sales for export contain some notable items. No less than 60,000 tons of plain wire for France is reported from Chicago. For Africa America has taken 12,000 tons of rails, according to our London cable. A Russian inquiry is for 30,000 axles complete with the wheels, though the long expected additional Russian purchase of railroad cars has not been consummated nor the 60,000 tons of rails and 14,000 tons of track accessories.

That plant extensions and generally small work have been the order in the fabricated steel industry and are an explanation of the heavy demand that was hardly discernible in the absence of jobs of spectacular size is shown in the report from Chicago that the average number of tons on contracts taken in the last six months was 115 against 175 tons for the six months preceding. As an average of 87½ per cent of the capacity of the bridge and structural shops was put under contract over the last six months and 64 per cent for the half year preceding, it follows that there were twice as many jobs taken in the one period as in the earlier.

Just as Bessemer merchant bars were for a time somewhat easier to get than open-hearth bars, now there is a $2 differential between Bessemer sheets and open-hearth sheets. The week's advance of $1 to $2 per ton for blue annealed, box annealed and galvanized sheets applies to the Bessemer product while the open-hearth now comes even higher.

The price advances of the week also include $2 per ton on black, galvanized and line pipe, $5 on shafting, $2 on wire products, with wire rods at $50, and $2 on spikes. Pig iron is stronger in some markets.

One instance of late waking to a need is obtained in an inquiry from the Long Island Railroad for about 8000 tons of rails, about 3000 tons being wanted in March.

Chicago

CHICAGO, ILL., Feb. 16, 1916.—(*By Wire.*)

Although not specifically emphasized, it is known that recent distributions of mill tonnage for the second half included the allotments of material to implement manufacturers which are usually negotiated at a later date in connection with annual contracts from July to July. The contracts covering this implement tonnage will, with a possible exception, provide only for the period to Jan. 1 and will require full specifications to be made in the third quarter. Contract obligations closed last week totaled 120,000 tons for one interest, but the greater number of mills have done nothing as yet in the direction of contract making for the last half. Inquiries for steel in various forms and covering materials for use both here and abroad continue to pour in upon the mills. The Russian inquiry for 30,000 axles, complete with wheels, and the sale of 60,000 tons of plain wire to France, were features of last week's activities. The week also brought numerous increases

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	Feb. 16, 1916.	Feb. 9, 1916.	Jan. 19, 1916.	Feb. 17, 1915.
No. 2 X, Philadelphia...	$20.00	$20.00	$20.00	$14.25
No. 2, Valley furnace....	18.25	18.25	18.50	13.00
No. 2 Southern, Cin'ti...	17.90	17.90	17.90	12.40
No. 2, Birmingham, Ala.	15.00	15.00	15.00	9.50
No. 2, furnace, Chicago*	18.50	18.50	18.50	13.00
Basic, del'd, eastern Pa..	19.50	19.50	19.50	13.50
Basic, Valley furnace....	17.75	17.50	17.75	12.50
Bessemer, Pittsburgh....	21.45	21.45	21.45	14.55
Malleable Bess., Ch'go*..	19.00	19.00	19.00	13.00
Gray forge, Pittsburgh..	18.45	18.45	18.45	13.45
L. S. charcoal, Chicago.	19.75	19.75†	19.75	15.75
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh..	33.00	33.00	32.00	19.50
O.-h. billets, Pittsburgh..	35.00	35.00	33.00	19.50
O.-h. sheet bars, P'gh....	35.00	35.00	35.00	20.50
Forging billets, base, P'gh	55.00	55.00	55.00	24.00
O.-h. billets, Phila.....	42.00	42.00	42.00	21.40
Wire rods, Pittsburgh...	50.00	47.00	45.00	25.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	2.409	2.409	2.259	1.20
Iron bars, Pittsburgh....	2.15	2.15	1.95	1.10
Iron bars, Chicago.....	1.90	1.90	1.75	1.07½
Steel bars, Pittsburgh...	2.25	2.25	2.00	1.10
Steel bars, New York...	2.669	2.419	2.169	1.26
Tank plates, Pittsburgh..	2.50	2.50	2.25	1.10
Tank plates, New York..	2.919	2.669	2.519	1.26
Beams, etc., Pittsburgh..	2.00	2.00	1.90	1.10
Beams, etc., New York..	2.169	2.169	2.069	1.26
Skelp, grooved steel, P'gh	2.00	1.90	1.80	1.10
Skelp, sheared steel, P'gh	2.10	2.00	1.90	1.15
Steel hoops, Pittsburgh..	2.25	2.25	2.00	1.20

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.
†Erroneously printed $19.45 for Feb. 2 and 9.

Sheets, Nails and Wire,	Feb. 16, 1916.	Feb. 9, 1916.	Jan. 19, 1916.	Feb. 17, 1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.60	2.60	2.60	1.80
Galv. sheets, No. 28, P'gh	4.75	4.75	4.75	3.25
Wire nails, Pittsburgh...	2.30	2.20	2.10	1.60
Cut nails, Pittsburgh....	2.20	2.10	2.00	1.55
Fence wire, base, P'gh..	2.15	2.05	1.95	1.40
Barb wire, galv., P'gh...	3.15	3.05	2.95	2.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	17.25	17.25	17.50	11.75
Iron rails, Philadelphia..	19.50	19.50	19.50	13.00
Carwheels, Chicago.....	13.75	13.75	14.75	10.00
Carwheels, Philadelphia..	16.50	16.50	16.50	10.50
Heavy steel scrap, P'gh.	17.00	17.00	17.50	11.75
Heavy steel scrap, Phila..	16.50	16.50	16.50	10.00
Heavy steel scrap, Ch'go.	14.75	14.75	15.25	9.75
No. 1 cast, Pittsburgh..	15.75	15.75	15.75	11.25
No. 1 cast, Philadelphia..	17.00	17.00	17.00	12.00
No. 1 cast, Ch'go (net ton)	12.75	12.75	13.00	9.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt....	$3.75	$3.50	$3.00	$1.50
Furnace coke, future...	2.50	2.50	2.50	1.65
Foundry coke, prompt....	3.50	3.50	3.50	2.00
Foundry coke, future....	3.25	3.25	3.25	2.15
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.	27.37½	26.50	24.00	15.25
Electrolytic copper, N. Y.	27.25	26.37½	23.62½	14.62½
Spelter, St. Louis.....	20.00	19.00	18.25	8.75
Spelter, New York.....	20.25	19.25	18.50	9.00
Lead, St. Louis.....	6.15	6.00	5.70	3.72½
Lead, New York.....	6.25	6.10	5.90	3.85
Tin, New York.....	42.25	41.12½	40.75	36.12½
Antimony, Asiatic, N. Y.	43.50	43.50	42.00	18.50
Tin plate, 100-lb. box, P'gh.	$4.00	$4.00	$3.75	$3.10

in price. Spikes, bolts, and rivets are at least $2 per ton higher and quotations for plates and blue annealed sheets are rapidly making 3c., Pittsburgh, a common price. In store prices an advance of $2 per ton for shapes, plates and bars and $3 per ton for rivets is announced, while shafting has reached the record quotation of 35 per cent off. Rerolling billets have been quoted at $42 f.o.b. Western mill, and forging billets $55 base. A further advance of $2 per ton in the prices of wire is effective. There is a fair inquiry for pig iron, the negotiations of the leading implement manufacturer being of special interest.

Pig Iron.—Continuing sales of speculative iron from the South at irregular prices, and in lots sometimes as large as 500 tons, have done much to excite interest as to the firmness of the market in that class of pig iron. Better than $15, Birmingham, has been done for first half shipment and better than $15.50 for second half, on other than direct furnace sales, but, with the possible exception of one furnace of small capacity, Southern producers are apparently holding firmly to minimums of $15 and $15.50, with $16 asked by at least one interest for second half. In some cases, lower quotations at delivery point may be explained in connection with water and rail shipment. A number of transactions are noted in the last week involving Southern iron, including two of 500 tons and one of 1200 tons. There has also been a fair inquiry for local iron, with some sales of basic, foundry and malleable. Basic sales were on the basis of $18.50 and $18.75 figured back to Chicago furnaces. For Lake Superior charcoal iron we quote delivery prices at Chicago, including a freight of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.00
Northern coke foundry, No. 2	18.50
Northern coke foundry, No. 3	18.00
Southern coke, No. 1 f'dry and 1 soft	$19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft	19.00 to 19.50
Malleable Bessemer	19.00
Basic	18.50 to 19.00
Low phosphorus	34.00 to 36.00
Silvery, 8 per cent	27.50
Bessemer ferrosilicon, 10 per cent	30.50

(By Mail)

Rails and Track Supplies.—Current inquiries for rails are limited to a few of minor importance. A minimum advance of $2 per ton in the price of spikes and bolts is noted, and, although the time is somewhat belated for buying this material, it is understood that the advance was preceded by purchases of over 50,000 kegs in this market. We quote standard railroad spikes at 2.35c. to 2.50c., base; track bolts with square nuts, 2.60c. to 2.75c., base, all in carload lots, Chicago; tie plates, $40, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.52c.; 16 to 20 lb., 1.57c.; 12 lb., 1.62c.; 8 lb., 1.67c.; angle bars, 1.50c., Chicago.

Structural Material.—To the elusive inquiry for cars for Russia has been added an inquiry for 30,000 axles mounted in wheels. The Southern Pacific last week closed for a total of 3500 cars. Contracts for fabricated material included 1300 tons, taken by the American Bridge Company for the Kansas City Southern Railway bridge and 400 tons, taken by the same company, for mill extensions at Gary. The Santa Fé Railroad placed 240 tons, each, with the Lackawanna Bridge Company and the Missouri Valley Bridge & Iron Company, for new shops at Topeka and Albuquerque. Other small jobs, each of less than 200 tons, were taken by the Gage Structural Steel Company and the Wisconsin Bridge & Iron Company. Evidence of the lack of work of large tonnage, open for general competition in the last six months, is found in the report of a number of bridge shops to the effect that work figured averaged only 115 tons to the contract, as against 175 tons in the preceding six months. However, this small work has been generally very profitable. In connection with the recent distribution of mill tonnage, contracting for plain material has been heavy, the bookings last week of one interest alone totaling 120,000 tons. Reports indicate that the extent to which users of steel, dependent upon Western mills, have been able to secure protection for their requirements, is in marked contrast to conditions elsewhere. Except for one or two instances, Eastern mills have not yet made any contracts in this territory for last half shipment. We quote for Chicago delivery of plain material from mill 2.189c.

Store business of the past week presented many evidences of a sharp awakening on the part of steel users to the ex-

tremities of the situation. With the increased demand a further advance in prices is noted and we quote for Chicago delivery of structural steel out of stock 2.60c.

Plates.—Quotations for plates continue to soar without any apparent relation to base prices. A sale of a small tonnage for Pacific coast delivery, in the first quarter, at 3c., Chicago, is reported, while another transaction involving 300 tons was closed on the basis of 3c., Pittsburgh. Prices as high as 2.75c., Pittsburgh, for second-half delivery have been named. The plates for the several Norwegian boats to be built at Manitowoc, Wis., totaling about 8500 tons, have been placed at Chicago. For last half contracts we quote for Chicago delivery from mill 2.289c.

Prices for plates out of stock for Chicago delivery have been advanced $2 a ton and we quote 2.80c.

Sheets.—A sale of 300 tons of blue-annealed sheets for early delivery has been made on the basis of 3c., Pittsburgh, while for a small tonnage of one-pass sheets for prompt shipment a similar price is reported. With the recent jump in spelter prices, quotations for galvanized sheets have been again disorganized and some of the mills, which have thus far been continuous sellers, have withdrawn their prices. We quote for Chicago delivery from mill, No. 10 blue annealed, 2.939c.; No. 28 black, 2.889c.; No. 28 galvanized, 5c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 2.95c.; No. 28 black, 3c.; No. 20 and heavier galvanized, 4.80c.; No. 22 and lighter, 5c.

Bars.—A startling indication of prices being quoted is found in the sale last week of 1000 tons of forging billets at $55 base, f.o.b. mill, the billets carrying, in addition, extras of $7 per ton. Bar-iron tonnage is somewhat heavier, and one of the local mills, with schedules calling for full-capacity operation for 90 days ahead, is out of the market. High-carbon steel prices have been raised to a minimum of 2c. We quote mill shipments, Chicago, as follows: Bar iron, 1.90c.; soft steel bars, 2.189c.; hard steel bars, 1.90c. to 2c.; shafting, in carloads, 45 per cent off; less than carloads, 40 per cent off.

The price of bars out of store is up $2 per ton and we quote store prices for Chicago delivery: Soft steel bars, 2.50c.; bar iron, 2.50c.; reinforcing bars, 2.50c., base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 25 per cent off.

Rivets and Bolts.—Although the local demand for rivets is not especially pressing, quotations in this market have followed the advance in the East, where ship rivets in particular are being bought heavily. For bolts and nuts, the resumption of railroad inquiry is of unexpected importance. Specifications against first half contracts have already absorbed so large a portion of the supply intended to cover requirements until July that new inquiry is now appearing. On a contract for 2,000,000 lag screws for holding down tie plates, one road has already taken out half of that number at the rate of 500,000 a month. While the quoted level of prices is in a measure nominal, sales can be made freely on the basis of the prices effective immediately preceding the recent advance. We quote as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 70; cut thread, 65-10; larger sizes, 60-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 70-5; cut thread, 70; larger sizes, 60-10; gimlet point coach screws, 70-10; hot pressed nuts, square, $4 off per 100 lb.; hexagon, $4.20 off. Structural rivets, ¾ to 1¼ in., 2.60c. to 2.65c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

We quote prices, out of store: Structural rivets, 2.95c.; boiler rivets, 3.05c.; machine bolts up to ⅞ x 4 in., 70-12½; larger sizes, 65-10; carriage bolts up to ⅞ x 6 in., 70-5; larger sizes, 65 off; hot pressed nuts, square, $4.50, and hexagon, $4.70 off per 100 lb.; lag screws, 75.

Cast-Iron Pipe.—Inquiry for pipe is heavier and tonnage in sight includes a letting at St. Louis of 7200 tons; at Bloomington, Ind., 800 tons; at Kalamazoo, Mich., 300 tons; at Bay City, Mich., 300 tons, and at Rockford, Ill., 650 tons. The leading interest will furnish 1100 tons for Kansas City and 1500 tons for Milwaukee. Another 1700 tons for Milwaukee will be supplied by the American Cast Iron Pipe Company. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $32.50 to $33; 6 in. and larger, $29.50 to $30, with $1 extra for class A water pipe and gas pipe.

Wire Products.—The placing of an order here for over 60,000 tons of plain wire for export to France was an interesting transaction of the week. Prices have been advanced $2 per ton and we quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $2.339; wire nails, $2.489; painted barb wire, $2.639; galvanized barb wire, $3.339; polished staples, $2.639; galvanized staples, $3.339, all Chicago.

Old Material.—The necessity of a further lowering of prices in order to make sales has been the rule in the transactions of the past week. Not only has buying been limited in this market and at Eastern consuming centers, which take a large tonnage produced in this district, but the amount of scrap offered continues abundant. A measure of relief is hoped for in the current small offerings of railroad scrap, the railroads apparently preferring to hold their materials for an anticipated upward turn in the market. Concerning the future, the market reflects a stronger hope of early improvement in prices of rolling-mill scrap rather than in steel scrap. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$17.25 to $17.75
Relaying rails	19.50 to 20.50
Old carwheels	13.75 to 14.25
Old steel rails, rerolling	17.00 to 17.50
Old steel rails, less than 3 ft	16.50 to 16.75
Heavy melting steel scrap	14.75 to 15.25
Frogs, switches and guards, cut apart	14.75 to 15.25
Shoveling steel	14.50 to 15.00
Steel axle turnings	11.50 to 12.00

Per Net Ton

Iron angles and splice bars	$17.00 to $17.25
Iron arch bars and transoms	18.00 to 18.50
Steel angle bars	14.00 to 14.50
Iron car axles	19.50 to 20.00
Steel car axles	21.50 to 22.00
No. 1 railroad wrought	14.75 to 15.25
No. 2 railroad wrought	14.00 to 14.25
Cut forge	14.00 to 14.50
No. 1 busheling	12.00 to 12.50
No. 2 busheling	8.75 to 9.00
Pipes and flues	10.50 to 11.00
Steel knuckles and couplers	14.50 to 15.00
Steel springs	15.25 to 15.75
No. 1 boilers, cut to sheets and rings	10.50 to 11.00
Boiler punchings	13.75 to 14.25
Locomotive tires, smooth	17.00 to 17.50
Machine shop turnings	8.00 to 8.25
Cast borings	7.25 to 7.75
No. 1 cast scrap	12.75 to 13.00
Stove plate and light cast scrap	10.75 to 11.00
Grate bars	11.00 to 11.25
Brake shoes	10.25 to 10.75
Railroad malleable	13.25 to 13.50
Agricultural malleable	11.00 to 11.50

Philadelphia

PHILADELPHIA, PA., Feb. 15, 1916.

Steel makers continue to decline new business, yet their obligations to customers preclude any opportunity of catching up on deliveries. Their unfilled orders are not only undiminished and sufficient to keep their capacity employed for several months, but crowding on orders booked is a large amount of waiting business. Plates continue to be a great problem, and wonder is expressed as to how the demands of ship, locomotive and car builders will be satisfied. Prices of finished and semi-finished steel show little or no change. Foundry pig iron continues quiet, and an easier tendency is observed. The coke market continues in an upset condition, with the demand for spot coke eager because of the freight situation. Various consumers snapped up 3000 tons of 80 per cent English ferromanganese which was offered for future delivery last week at an advance of $25 per ton. Arrivals of foreign ore at this port in the week ended Feb. 12 totaled 26,886 tons.

Pig Iron.—No important buying is reported. Business has been confined to small lots of foundry grades for which prices are generally well maintained, although there is reason to believe that at least one brand of eastern Pennsylvania No. 2 X which has been held at $20, furnace, has been offered at less. The minimum delivered price continues near $20, and the market as a whole is strong. Buffalo No. 2 X is quoted at $19, furnace, for the remainder of the year, equal

to $21.58, Philadelphia. Resale Buffalo No. 2 X is quoted at the same level, except for off grades. The minimum quotation for Virginia No. 2 X is $20.75, Philadelphia. The Pennsylvania Railroad has not yet closed, though the order is impending, for the 2300 tons of miscellaneous grades it has had under inquiry for the past week or more. One or two minor inquiries for basic have come out, but there has been no actual business since the Lukens Iron & Steel Company purchased 77,500 tons last week. It is now understood that 10,000 tons of the quantity referred to will come from a Buffalo furnace, and that the price was something better than $19.50, delivered, one consideration being that the Buffalo iron is to be especially low in phosphorus. Producers continue to suffer keenly from the uncertain movement of freight. When an embargo is raised they act quickly to get all the iron they can through to their customers in the district relieved, and when shipments are headed off again they turn their attention in some other direction. The New York, New Haven & Hartford Railroad announced Monday that it would take freight from the New York Central, Boston & Albany, Pennsylvania, Baltimore & Ohio and other railroads, but it is questionable how long the embargo will be raised. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.75 to $20.75
Eastern Pa., No. 2 plain	19.50 to 20.50
Virginia, No. 2 X foundry	20.75
Virginia, No .2 plain	20.25
Gray forge	19.00 to 19.50
Basic	19.50 to 20.00
Standard low phosphorus	32.00

Iron Ore.—Arrivals at this port in the week ended Feb. 12 were heavy, consisting of 5800 tons from Cuba, 6700 tons from Chile, 9491 tons from Sweden and 4895 tons from Spain.

Ferroalloys.—The agent of an English maker last week received a cable authorizing the sale of 3000 tons of 80 per cent ferromanganese for last half delivery at $150, seaboard. The entire quantity was sold in scattered lots and taken with a rush. Spot is exceedingly scarce and nominally quoted at $225 to $250. The arrival of 608 tons of ferromanganese and 10 tons of ferrochrome at this port last week is reported.

Bars.—The situation is unchanged, except that steel bars are possibly a little more difficult to obtain. Deliveries to be made at the convenience of the mills are quoted at 2c., Pittsburgh, or 2.159c., Philadelphia. Higher prices are obtained where deliveries can be specified. Iron bars, for which there is a good demand, are quoted at 2.409c., Philadelphia.

Plates.—The mills have orders on their books which will keep them busy for six to nine months, and have further business in sight which will require all of their capacity for a year to come. Although they are doing the best they can, the mills are receiving many expressions of dissatisfaction from their customers. The producers say they cannot see where all of the plates required for boats, locomotives and cars are to come from. Several mills have felt obliged to decline to quote on the requirements of the Lenoir Car Works, and the Pennsylvania Railroad has not yet bought. The larger mills are not inclined to sell under 3c., future and indefinite delivery. One mill continues to quote 2.809c. to 3.059c., Philadelphia.

Structural Material.—Both the Lenoir Car Works and the Pennsylvania Railroad have yet to find mills that will undertake to supply their requirements for car shapes. Not much in the way of building is reported in this territory. The Baldwin Locomotive Works has contracted for a large structure at its plant in this city, but plans have been changed, it is understood, because of restrictions imposed by the city authorities. Eastern mills continue to quote 2.10c., Pittsburgh, as their minimum, and where shipments are for the West 2.25c. at Eastern mill is asked.

Billets.—The situation is even more acute than it has been and where quotations can be secured they are $40 to $45 for open-hearth rerolling billets, and $55 to $60 for forging steel.

Sheets.—No. 10 blue annealed are strong at 2.905c. to 3.159c., according to delivery.

Coke.—The coke market continues in bad shape. Many consumers are not getting deliveries under their contracts and are eager to buy spot coke with the result that they are sometimes getting material belonging to their neighbors. Not only have the embargoes interfered with shipments but some of the railroads have been unwilling to let their cars leave their own rails. In at least one instance they refused to haul some cars which had been loaded until the destination was changed to a point on their own line. Spot furnace coke has sold at $3.50 to $3.75 per net ton at oven, and for first half at $2.50 to $3. Prompt foundry is held at $4 to $4.50 per net ton at oven and contract foundry at $3.50 to $3.75. It is reported that 12,000 tons of foundry for delivery in the year beginning July 1 has been contracted for by New England founders at $3.75 per net ton at oven. Freight rates from the principal producing districts follow: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—But little change is noted in the situation, although the quotations for steel and iron axles are considered nominal. A good deal of material has been sold which cannot be moved because of the freight embargoes against certain districts. Shipments of mixed borings and turnings have been made to western Pennsylvania blast furnaces. Material of this sort is quoted at about $9.50 to $9.75 per ton. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$16.50 to $17.00
Old steel rails, rerolling	19.00 to 20.00
Low phos. heavy melting steel scrap	21.50 to 22.50
Old steel axles	25.00 to 26.00
Old iron axles	27.00 to 28.00
Old iron rails	19.50 to 20.00
Old carwheels	16.50 to 17.00
No. 1 railroad wrought	21.50 to 22.00
Wrought-iron pipe	15.25 to 15.75
No. 1 forge fire	14.00 to 14.50
Bundled sheets	14.00 to 14.50
No. 2 busheling	11.00 to 11.50
Machine shop turnings	10.00 to 10.50
Cast borings	11.00 to 11.50
No. 1 cast	17.00 to 18.00
Grate bars, railroad	12.50 to 13.00
Stove plate	13.00 to 13.50
Railroad malleable	15.00 to 15.50

Laird U. Park, who for 10 years has been connected with Naylor & Co., and Leonard W. Williams, of the Pulaski Iron Company, have formed a partnership under the name of Park & Williams, with offices at 1527 Real Estate Trust Building, Philadelphia, to carry on a commission business in iron, steel, ores, alloys, coal and coke. They will be agents for Naylor & Co., the George S. Good Fire Brick Company and Larlen coal and coke.

Buffalo

BUFFALO, N. Y., Feb. 15, 1916.

Pig Iron.—Prices for all grades have been advanced 50c. to $1 per ton, the present range being from $18.50, at furnace, for the lower grades to $19.50 for No. 1 foundry, $19 being the average for No. 2 X foundry for the current and last half delivery; for 3.50 to 4 per cent silicon, $20, at furnace, and for the higher silicons, $21 to $22, at furnace, are the ruling prices. Producers believe that inside of a month there will be a pronounced increase in consumption and that deliveries will be even more urgently called for than at present. The small foundries in particular, in this district, are apparently becoming more and more busy. We quote as follows, f.o.b. furnace, for current and last half delivery:

No. 1 foundry	$19.00 to $19.50
No. 2 X foundry	18.75 to 19.00
No. 2 plain	18.50 to 18.75
No. 3 foundry	18.50
Gray forge	18.50
Malleable	19.00 to 19.50
Basic	19.00 to 20.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Pressure for delivery of material as well as pressure to buy on new orders has been renewed during the week and is as strong as at any time in the past six months. The demand is espe-

cially heavy for plates; one instance is known where one of the largest users in Buffalo territory placed a contract for 1000 tons at 2½c. base, Pittsburgh. One of the large bar users of the district was unable to obtain all of the material he required from his usual sources of supply and made strenuous efforts to place an outright order for several hundred tons with another mill without success. A few of the producers of bars state that they are practically sold up to the end of the year for the product of some of their mills and in several instances tonnage already on the books will force delivery into the early part of next year if all should be ordered out. A number of instances are known where buyers have specified first half contracts in full and have attempted to take out additional tonnage only to find it impossible for the mills to entertain acceptance of such contracts at this time. Numerous advances in prices have been made. The Phoenix Bridge Company has received contract for 450 tons of steel for the Sibley, Lindsay & Curr Company's department store addition, Rochester. The Ferguson Steel & Iron Company, Buffalo, took the 1400 tons of steel for the Ten Eyck Hotel addition, Albany.

Old Material.—The market shows increasing signs of strength and the volume of business transacted in the week has been large, particularly in heavy melting steel and wrought scrap. Shipments are going to steel mills without interruption. There have been no noteworthy features, however, and no change in prices. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$16.50 to $17.00
Low phosphorus steel	21.00 to 21.50
No. 1 railroad wrought scrap	19.00 to 19.50
No. 1 railroad and machinery cast, scrap	16.00 to 16.50
Old steel axles	24.00 to 24.50
Old iron axles	24.00 to 24.50
Old carwheels	15.25 to 15.75
Railroad malleable	15.25 to 15.75
Machine shop turnings	7.75 to 8.25
Heavy axle turnings	12.00 to 12.50
Clean cast borings	9.25 to 9.75
Old iron rails	17.50 to 18.00
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	13.00 to 13.50
Bundled sheet scrap	12.00 to 12.50
No. 1 busheling scrap	14.50 to 15.00
No. 2 busheling scrap	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Cleveland

CLEVELAND, OHIO, Feb. 15, 1916.

Iron Ore.—The scarcity of available vessel tonnage for ore is indicated by the fact that a furnace interest yesterday chartered a boat for ore from Escanaba at 60c., or 25c. per ton higher than the regular season rate. While vessel tonnage is hard to find, ore firms are well covered with charters and they do not expect to have any trouble in getting down all that will be sold. Several of the shippers have under charter all the boats they will need for the season. The market is inactive and very little buying is expected for some time. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Coke.—The market is very dull but prices are firm. Shipments appear to be coming along slightly better so there is very little demand for spot coke from foundries that have been forced recently to piece out with spot shipment orders. We quote standard Connellsville foundry coke at $3.75 to $4.50 per net ton at oven for prompt shipment and $3.50 to $3.75 for contracts. Furnace coke is held at about $3.50 for prompt shipment.

Pig Iron.—The foundry iron market shows more life. Valley furnaces report an improvement in the volume of business in last half contracts which are being placed at $18.50, at furnace, for No. 2 foundry. The local market is rather dull, although some foundries are buying additional iron for delivery before July in lots of 100 to 500 tons. Cleveland prices are firm at $19, at furnace, for No. 2 for local delivery and $18.50 for out of town shipments. Steel-making iron is quiet, although one round lot sale of basic iron is reported at $18 for second quarter delivery. Southern iron is quiet. Some resale Southern iron is still to be had at $14.25. However, the minimum furnace price is $14.50, Birmingham, for second quarter, and $15 for last quarter. Alabama furnaces are quoting at $15.50 to $16. We quote, delivered Cleveland, as follows:

Bessemer	$21.45 to $21.95
Basic	18.95 to 19.30
Northern No. 2 foundry	19.30
Southern No. 2 foundry	18.25 to 19.00
Gray forge	18.30
Jackson Co. silvery 8 per cent silicon	26.62
Standard low phos., Valley furnace	32.00

Bolts, Nuts and Rivets.—Automobile makers are in the market for their bolt and nut requirements for the year from July 1, but may be unable to secure contracts for delivery beyond January. The demand continues heavy, and another advance in prices is expected, probably this week. Rivets are in heavy demand, and the high price of steel may necessitate a further advance shortly. We quote rivets at 2.70c., Pittsburgh, for structural and 2.80c., for boiler rivets for immediate delivery, with a $2 advance for future delivery until July 1. Bolt and nut discounts are as follows:

Common carriage bolts ⅝ x 6 in., smaller or shorter, rolled thread, 70 off, cut thread, 65 and 10; larger or longer, 60 and 5; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 70 and 5; cut thread, 70, larger and longer, 60 and 10; lag bolts, gimlet or cone point, 70 and 10, square h.p. nuts, blank or tapped, $4 off the list; hexagon h.p. nuts, blank or tapped, $4.20 off; c.p.c. & t. square nuts, blank or tapped, $3.75 off; hexagon nuts, 11 sizes, $4.75 off; cold pressed semi-finished hexagon nuts, all sizes, 75 and 10 off.

Finished Iron and Steel.—The new demand for steel for specific work is heavy and there is a great deal of inquiry for third and fourth quarter contracts. Consumers are having much difficulty in covering for their early and future requirements. Among contracts placed is one by an Ohio automobile company for about 20,000 tons of steel bars for third quarter delivery at 2c., base, Pittsburgh. Corrigan, McKinney & Co. are now shipping ingots from their new Cleveland steel plant, having sold a round tonnage for delivery before the start of their blooming mill which will be about April 1. They are now operating six of their eight open-hearth furnaces. Shafting prices have been advanced to 40 per cent off for car load lots and 35 per cent for smaller lots, and some contracts are being placed at the higher price. One Pittsburgh district mill is offering small angles, beams and channels at 2.15c. to 2.50c. and bars at 2.25c. to 2.50c. for early shipment. After a slight lull in the plate market the demand is again heavy and local mills are closing up considerable tonnage for second quarter delivery at 2.75c., Pittsburgh, which is their ruling price for early shipment. Railroad spikes have been advanced to 2.35c. Wire prices have been advanced $2 per ton to $2.15, Pittsburgh, for plain wire and wire nails to $2.30. There is a heavy demand for steel for reinforcing purposes and the price of hard steel bars continues to advance. The last sale in this market was made at 2.25c., Pittsburgh. In structural lines the Massillon Bridge & Structural Company has taken 1025 tons for a cement plant for the German-American Cement Company, La Salle, Ill.; 100 tons for a building for the Holland Stone Company, Tiffin, Ohio, and 100 tons for an addition to the plant of the Kilby Mfg. Company, Cleveland. The American Bridge Company has taken 225 tons for a factory building for the Glidden Varnish Company, Cleveland. Bids have been taken for a building for the Gier Pressed Steel Company, Lansing, Mich., requiring 750 tons. The Cleveland Railway Company has placed 1000 tons of rails with the Lackawanna Steel Company and 1000 with the Lorain Steel Company. An inquiry is pending for 5000 tons of light steel rails for export. The demand for black and blue annealed sheets is heavy and prices are firm. Some of the Ohio mills are out of the market, being sold up until July. We quote black sheets at 2.60c. to 2.75c., Ohio mill, for No. 28; blue annealed, 2.65c. to 2.85c. for No. 10, and galvanized, 3.75c. to 3.85c. Iron bars are quoted at 2.25c. to 2.35c., Cleveland. Warehouse prices have been advanced $2 per ton

on steel bars and structural material to 2.70c., and $3 on plates to 2.85c. A further advance on warehouse prices has been made on shafting to 15 per cent, and hoop steel out of stock has been advanced to 3.20c.

Old Material.—The market is dull and weak. Mills have all the scrap they need for the present, and more is being offered than is easily absorbed. Consequently dealers are finding it hard to move material on the track except at concessions. The softening tendency, however, does not apply to scrap for future delivery which is firm. Most trading is between dealers. Heavy melting steel is 25c. per ton lower in this market, some being sold at $15.75. This grade is quoted at $17 to $17.25 for delivery in Youngstown. Turnings are firm, some sales being made to local mills at $8. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails	$16.50 to $17.00
Old iron rails	19.00
Steel car axles	25.00 to 26.00
Heavy melting steel	15.75 to 16.00
Old carwheels	14.00 to 14.50
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	14.00 to 14.25
Railroad malleable	16.75 to 17.00
Steel axle turnings	13.25 to 13.50
Light bundled sheet scrap	13.25 to 13.50

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	8.50 to 9.00
Iron and steel turnings and drillings	7.50 to 8.00
No. 1 busheling	14.25 to 14.50
No. 1 railroad wrought	17.00 to 17.50
No. 1 cast	14.00 to 14.50
Railroad grate bars	10.50 to 11.00
Stove plate	10.50 to 11.00

Pittsburgh

PITTSBURGH, PA., Feb. 15, 1916.

If conditions in the steel trade continue as they are now, it is estimated that the mills will not have more than about one-fourth of the finished material in the second and third quarters that customers will want. This is figured on the basis that consumers are buying about double the amount of material they were purchasing last year, and the mills are taking orders for about one-half of what consumers want to place, and at that are not making any definite promises as to deliveries. The market has every appearance of developing in second and third quarters a more serious shortage in supply of finished products than now exists, as it will be impossible for the mills to increase their output, since they are now running to 100 per cent capacity, and have been for months. If it is found that domestic consumers are not willing to pay the present high prices, the mills can easily divert the steel to other products and export them at higher prices than they obtain from domestic users. The situation is altogether in favor of the mills, and consumers will have to make the best terms they can, and be satisfied with whatever the mills can give them. Price advances during the week were numerous. Basic pig iron, on a sale of 3000 tons, is up about 25c., open-hearth billets have sold as high as $40 for prompt shipment, tin plate with nearly all mills is up 25c. per box, railroad spikes $2 per ton, skelp $2, wire rods $5, shafting $5, rivets $2, black and galvanized steel pipe $2, and furnace coke 25c. per ton on account of a car shortage. Continued advances in prices do not abate the demand in the slightest, it being as insistent as ever, with the pressure on the mills for material as strong as at any time.

Pig Iron.—The first sale of basic iron of any moment for some time was made last week, being 3000 tons, sold to a leading consumer in the Shenango Valley at the reported price of $17.75, Valley furnace, for second quarter. There is no other new inquiry for Bessemer or basic, and foundry iron is also quiet. The molders' strike in the foundries in the Pittsburgh district, which has been going on since early in December, has interfered materially with the consumption of foundry iron, and also with buying for second and third quarters. There is still some inquiry for Bessemer iron for export to Italy, but sellers realize it is useless to quote on account of the railroad embargo. We quote standard Bessemer iron at $20.50; basic, $17.75; malleable Bessemer, $17.50; gray forge, $17.50, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—When a new sale of billets is reported, it is usually at a price $2 to $3 per ton higher than the previous sale. As an example, a local dealer reports a sale of ordinary carbon open-hearth billets for March and April shipment of 3000 tons at $40, maker's mill. There are no regular prices on billets or sheet bars to consumers who come in the market, the seller quoting and usually getting a price much higher than consumers are paying for billets and sheet bars on sliding scale contracts. Prices realized by the mills on these contracts, but over which $3 to $5 per ton would be paid for prompt shipment, are as follows: Bessemer billets and sheet bars $33 and open-hearth billets and sheet bars $34 to $35, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $55 to $56, for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 per ton extra.

Ferroalloys.—The acute shortage in the supply of ferromanganese is still on, and consumers are much worried as to what they are going to do when their present supply is used. A local maker has been importuned many times by consumers to sell a car, or up to 300 to 500 tons at the existing market price, but so far has refused to do so in every case, desiring to reserve its entire output of ferromanganese for its own use. Prices on 80 per cent ferromanganese for prompt shipment range all the way from $225 up to $250 per ton, and sales of carload lots have been made in more than one case at the higher price. The nominal price of English 80 per cent is $125, seaboard, but a buyer who would place a contract at this price and take chances on delivery might not get his ferromanganese before late this year, and perhaps would not get it at all. The situation is serious, and if it goes on, some of the smaller steel works may have to shut down. We quote prompt 80 per cent ferromanganese at $225 to $250 per ton, and 20 per cent spiegeleisen at $40 per ton. We quote 50 per cent ferrosilicon for delivery through all of 1916 as follows: Up to 100 tons, $85; over 100 tons and up to 600 tons, $84, and over 600 tons, $83; all per gross ton, delivered in the Pittsburgh district.

Plates.—The Pressed Steel Car Company has taken 100 steel mine cars for the Wyoming Mine Company, fifty for the Modoc Coal Company, fifty for the Gulf Smokeless Mining Company and fifty for the Iroquois Coal Mining Company. The Cambria Steel Company has taken 310 steel freight cars for the South Buffalo Railway Company, and the Ralston Steel Car Company is reported to have taken an order for 2585 steel cars for the Southern Pacific. The Bessemer & Lake Erie is in the market for 400 steel hopper cars, and the New York Central has an inquiry out for 6000 tons of plates, shapes and bars for steel cars, and also an inquiry for 1000 steel hopper cars. Plate mills are sold up to July, and it is practically impossible to place orders with any mills for delivery before third quarter. Local mills are practically sold up on all the plates they can turn out this year, and one leading mill has taken some orders for plates for delivery in first quarter of 1917. We quote ¼-in. and heavier plates at 2.50c. to 2.60c. for delivery in third quarter. Reports are that sheared plates have sold as high as 2.75c., makers' mill, for May delivery.

Structural Material.—Local fabricators report the new inquiry very heavy, but are not bidding on much work, as they are filled up to October or beyond. The Jones & Laughlin Steel Company has taken 800 tons for furnace bindings and steel stacks for the new open-hearth steel plant of the Whitaker-Glessner Company, Wheeling, W. Va. Inquiries are in the market for about 6000 tons of steel for new open-hearth buildings for this company, expected to be placed in a short time. The McClintic-Marshall Company has taken 800 tons for extensions to buildings of the Baldwin Locomotive Works, Eddystone, Pa., and the American Bridge

cially heavy for plates; one instance is known where one of the largest users in Buffalo territory placed a contract for 1000 tons at 2½c. base, Pittsburgh. One of the large bar users of the district was unable to obtain all of the material he required from his usual sources of supply and made strenuous efforts to place an outright order for several hundred tons with another mill without success. A few of the producers of bars state that they are practically sold up to the end of the year for the product of some of their mills and in several instances tonnage already on the books will force delivery into the early part of next year if all should be ordered out. A number of instances are known where buyers have specified first half contracts in full and have attempted to take out additional tonnage only to find it impossible for the mills to entertain acceptance of such contracts at this time. Numerous advances in prices have been made. The Phoenix Bridge Company has received contract for 450 tons of steel for the Sibley, Lindsay & Curr Company's department store addition, Rochester. The Ferguson Steel & Iron Company, Buffalo, took the 1400 tons of steel for the Ten Eyck Hotel addition, Albany.

Old Material.—The market shows increasing signs of strength and the volume of business transacted in the week has been large, particularly in heavy melting steel and wrought scrap. Shipments are going to steel mills without interruption. There have been no noteworthy features, however, and no change in prices. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$16.50 to $17.00
Low phosphorus steel	21.00 to 21.50
No. 1 railroad wrought scrap	19.00 to 19.50
No. 1 railroad and machinery cast, scrap	16.00 to 16.50
Old steel axles	24.00 to 24.50
Old iron axles	24.00 to 24.50
Old carwheels	15.25 to 15.75
Railroad malleable	15.25 to 15.75
Machine shop turnings	7.75 to 8.25
Heavy axle turnings	12.00 to 12.50
Clean cast borings	9.25 to 9.75
Old iron rails	17.50 to 18.00
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	13.00 to 13.50
Bundled sheet scrap	12.00 to 12.50
No. 1 busheling scrap	14.50 to 15.00
No. 2 busheling scrap	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Cleveland

CLEVELAND, OHIO, Feb. 15, 1916.

Iron Ore.—The scarcity of available vessel tonnage for ore is indicated by the fact that a furnace interest yesterday chartered a boat for ore from Escanaba at 60c., or 25c. per ton higher than the regular season rate. While vessel tonnage is hard to find, ore firms are well covered with charters and they do not expect to have any trouble in getting down all that will be sold. Several of the shippers have under charter all the boats they will need for the season. The market is inactive and very little buying is expected for some time. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Coke.—The market is very dull but prices are firm. Shipments appear to be coming along slightly better so there is very little demand for spot coke from foundries that have been forced recently to piece out with spot shipment orders. We quote standard Connellsville foundry coke at $3.75 to $4.50 per net ton at oven for prompt shipment and $3.50 to $3.75 for contracts. Furnace coke is held at about $3.50 for prompt shipment.

Pig Iron.—The foundry iron market shows more life. Valley furnaces report an improvement in the volume of business in last half contracts which are being placed at $18.50, at furnace, for No. 2 foundry. The local market is rather dull, although some foundries are buying additional iron for delivery before July in lots of 100 to 500 tons. Cleveland prices are firm at $19, at furnace, for No. 2 for local delivery and $18.50 for out of town shipments. Steel-making iron is quiet, although one round lot sale of basic iron is reported at $18 for second quarter delivery. Southern iron is quiet. Some resale Southern iron is still to be had at $14.25. However, the minimum furnace price is $14.50, Birmingham, for second quarter, and $15 for last quarter. Alabama furnaces are quoting at $15.50 to $16. We quote, delivered Cleveland, as follows:

Bessemer	$21.45 to $21.95
Basic	18.95 to 19.30
Northern No. 2 foundry	19.30
Southern No. 2 foundry	18.25 to 19.00
Gray forge	18.30
Jackson Co. silvery 8 per cent silicon	26.62
Standard low phos., Valley furnace	32.00

Bolts, Nuts and Rivets.—Automobile makers are in the market for their bolt and nut requirements for the year from July 1, but may be unable to secure contracts for delivery beyond January. The demand continues heavy, and another advance in prices is expected, probably this week. Rivets are in heavy demand, and the high price of steel may necessitate a further advance shortly. We quote rivets at 2.70c., Pittsburgh, for structural and 2.80c., for boiler rivets for immediate delivery, with a $2 advance for future delivery until July 1. Bolt and nut discounts are as follows:

Common carriage bolts ⅝ x 6 in., smaller or shorter, rolled thread, 70 off, cut thread, 65 and 10; larger or longer, 60 and 5; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 70 and 5; cut thread, 70, larger and longer, 60 and 10; lag bolts, gimlet or cone point, 70 and 10, square h.p. nuts, blank or tapped, $4 off the list; hexagon h.p. nuts, blank or tapped, $4.20 off; c.p.c. & t. square nuts, blank or tapped, $3.75 off; hexagon nuts, 11 sizes, $4.75 off; cold pressed semi-finished hexagon nuts, all sizes, 75 and 10 off.

Finished Iron and Steel.—The new demand for steel for specific work is heavy and there is a great deal of inquiry for third and fourth quarter contracts. Consumers are having much difficulty in covering for their early and future requirements. Among contracts placed is one by an Ohio automobile company for about 20,000 tons of steel bars for third quarter delivery at 2c., base, Pittsburgh. Corrigan, McKinney & Co. are now shipping ingots from their new Cleveland steel plant, having sold a round tonnage for delivery before the start of their blooming mill which will be about April 1. They are now operating six of their eight open-hearth furnaces. Shafting prices have been advanced to 40 per cent off for car load lots and 35 per cent for smaller lots, and some contracts are being placed at the higher price. One Pittsburgh district mill is offering small angles, beams and channels at 2.15c. to 2.50c. and bars at 2.25c. to 2.50c. for early shipment. After a slight lull in the plate market the demand is again heavy and local mills are closing up considerable tonnage for second quarter delivery at 2.75c., Pittsburgh, which is their ruling price for early shipment. Railroad spikes have been advanced to 2.35c. Wire prices have been advanced $2 per ton to $2.15, Pittsburgh, for plain wire and wire nails to $2.30. There is a heavy demand for steel for reinforcing purposes and the price of hard steel bars continues to advance. The last sale in this market was made at 2.25c., Pittsburgh. In structural lines the Massillon Bridge & Structural Company has taken 1025 tons for a cement plant for the German-American Cement Company, La Salle, Ill.; 100 tons for a building for the Holland Stone Company, Tiffin, Ohio, and 100 tons for an addition to the plant of the Kilby Mfg. Company, Cleveland. The American Bridge Company has taken 225 tons for a factory building for the Glidden Varnish Company, Cleveland. Bids have been taken for a building for the Gier Pressed Steel Company, Lansing, Mich., requiring 750 tons. The Cleveland Railway Company has placed 1000 tons of rails with the Lackawanna Steel Company and 1000 with the Lorain Steel Company. An inquiry is pending for 5000 tons of light steel rails for export. The demand for black and blue annealed sheets is heavy and prices are firm. Some of the Ohio mills are out of the market, being sold up until July. We quote black sheets at 2.60c. to 2.75c., Ohio mill, for No. 28; blue annealed, 2.65c. to 2.85c. for No. 10, and galvanized, 3.75c. to 3.85c. Iron bars are quoted at 2.25c. to 2.35c., Cleveland. Warehouse prices have been advanced $2 per ton

on steel bars and structural material to 2.70c., and $3 on plates to 2.85c. A further advance on warehouse prices has been made on shafting to 15 per cent, and hoop steel out of stock has been advanced to 3.20c.

Old Material.—The market is dull and weak. Mills have all the scrap they need for the present, and more is being offered than is easily absorbed. Consequently dealers are finding it hard to move material on the track except at concessions. The softening tendency, however, does not apply to scrap for future delivery which is firm. Most trading is between dealers. Heavy melting steel is 25c. per ton lower in this market, some being sold at $15.75. This grade is quoted at $17 to $17.25 for delivery in Youngstown. Turnings are firm, some sales being made to local mills at $8. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails	$16.50 to $17.00
Old iron rails	19.00
Steel car axles	25.00 to 26.00
Heavy melting steel	15.75 to 16.00
Old carwheels	14.00 to 14.50
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	14.00 to 14.25
Railroad malleable	16.75 to 17.00
Steel axle turnings	13.25 to 13.50
Light bundled sheet scrap	13.25 to 13.50

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	8.50 to 9.00
Iron and steel turnings and drillings	7.50 to 8.00
No. 1 busheling	14.25 to 14.50
No. 1 railroad wrought	17.00 to 17.50
No. 1 cast	14.00 to 14.50
Railroad grate bars	10.50 to 11.00
Stove plate	10.50 to 11.00

Pittsburgh

PITTSBURGH, PA., Feb. 15, 1916.

If conditions in the steel trade continue as they are now, it is estimated that the mills will not have more than about one-fourth of the finished material in the second and third quarters that customers will want. This is figured on the basis that consumers are buying about double the amount of material they were purchasing last year, and the mills are taking orders for about one-half of what consumers want to place, and at that are not making any definite promises as to deliveries. The market has every appearance of developing in second and third quarters a more serious shortage in supply of finished products than now exists, as it will be impossible for the mills to increase their output, since they are now running to 100 per cent capacity, and have been for months. If it is found that domestic consumers are not willing to pay the present high prices, the mills can easily divert the steel to other products and export them at higher prices than they obtain from domestic users. The situation is altogether in favor of the mills, and consumers will have to make the best terms they can, and be satisfied with whatever the mills can give them. Price advances during the week were numerous. Basic pig iron, on a sale of 3000 tons, is up about 25c., open-hearth billets have sold as high as $40 for prompt shipment, tin plate with nearly all mills is up 25c. per box, railroad spikes $2 per ton, skelp $2, wire rods $5, shafting $5, rivets $2, black and galvanized steel pipe $2, and furnace coke 25c. per ton on account of a car shortage. Continued advances in prices do not abate the demand in the slightest, it being as insistent as ever, with the pressure on the mills for material as strong as at any time.

Pig Iron.—The first sale of basic iron of any moment for some time was made last week, being 3000 tons, sold to a leading consumer in the Shenango Valley at the reported price of $17.75, Valley furnace, for second quarter. There is no other new inquiry for Bessemer or basic, and foundry iron is also quiet. The molders' strike in the foundries in the Pittsburgh district, which has been going on since early in December, has interfered materially with the consumption of foundry iron, and also with buying for second and third quarters. There is still some inquiry for Bessemer iron for export to Italy, but sellers realize it is useless to quote on account of the railroad embargo. We quote standard Bessemer iron at $20.50; basic, $17.75; malleable Bessemer, $17.50; gray forge, $17.50, and No. 2 foundry, $18.25 to $18.50, all at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—When a new sale of billets is reported, it is usually at a price $2 to $3 per ton higher than the previous sale. As an example, a local dealer reports a sale of ordinary carbon open-hearth billets for March and April shipment of 3000 tons at $40, maker's mill. There are no regular prices on billets or sheet bars to consumers who come in the market, the seller quoting and usually getting a price much higher than consumers are paying for billets and sheet bars on sliding scale contracts. Prices realized by the mills on these contracts, but over which $3 to $5 per ton would be paid for prompt shipment, are as follows: Bessemer billets and sheet bars $33 and open-hearth billets and sheet bars $34 to $35, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $55 to $56, for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 per ton extra.

Ferroalloys.—The acute shortage in the supply of ferromanganese is still on, and consumers are much worried as to what they are going to do when their present supply is used. A local maker has been importuned many times by consumers to sell a car, or up to 300 to 500 tons at the existing market price, but so far has refused to do so in every case, desiring to reserve its entire output of ferromanganese for its own use. Prices on 80 per cent ferromanganese for prompt shipment range all the way from $225 up to $250 per ton, and sales of carload lots have been made in more than one case at the higher price. The nominal price of English 80 per cent is $125, seaboard, but a buyer who would place a contract at this price and take chances on delivery might not get his ferromanganese before late this year, and perhaps would not get it at all. The situation is serious, and if it goes on, some of the smaller steel works may have to shut down. We quote prompt 80 per cent ferromanganese at $225 to $250 per ton, and 20 per cent spiegeleisen at $40 per ton. We quote 50 per cent ferrosilicon for delivery through all of 1916 as follows: Up to 100 tons, $85; over 100 tons and up to 600 tons, $84, and over 600 tons, $83; all per gross ton, delivered in the Pittsburgh district.

Plates.—The Pressed Steel Car Company has taken 100 steel mine cars for the Wyoming Mine Company, fifty for the Modoc Coal Company, fifty for the Gulf Smokeless Mining Company and fifty for the Iroquois Coal Mining Company. The Cambria Steel Company has taken 310 steel freight cars for the South Buffalo Railway Company, and the Ralston Steel Car Company is reported to have taken an order for 2585 steel cars for the Southern Pacific. The Bessemer & Lake Erie is in the market for 400 steel hopper cars, and the New York Central has an inquiry out for 6000 tons of plates, shapes and bars for steel cars, and also an inquiry for 1000 steel hopper cars. Plate mills are sold up to July, and it is practically impossible to place orders with any mills for delivery before third quarter. Local mills are practically sold up on all the plates they can turn out this year, and one leading mill has taken some orders for plates for delivery in first quarter of 1917. We quote ¼-in. and heavier plates at 2.50c. to 2.60c. for delivery in third quarter. Reports are that sheared plates have sold as high as 2.75c., makers' mill, for May delivery.

Structural Material.—Local fabricators report the new inquiry very heavy, but are not bidding on much work, as they are filled up to October or beyond. The Jones & Laughlin Steel Company has taken 800 tons for furnace bindings and steel stacks for the new open-hearth steel plant of the Whitaker-Glessner Company, Wheeling, W. Va. Inquiries are in the market for about 6000 tons of steel for new open-hearth buildings for this company, expected to be placed in a short time. The McClintic-Marshall Company has taken 800 tons for extensions to buildings of the Baldwin Locomotive Works, Eddystone, Pa., and the American Bridge

Company has taken a bridge requiring 3000 tons, for the Philadelphia & Reading Railroad, at Sunbury, Pa., and 300 tons of bridge work for the Baltimore & Ohio. The minimum price on beams and channels up to 15 in. is 2c. at mill, for deferred deliveries, and from 2.25c. up to 2.50c. for fairly prompt shipments.

Steel Rails.—Very little is doing in standard sections, but the new demand for light rails is very active, the Carnegie Steel Company having taken in the past week new orders and specifications for about 4500 tons. We quote light rails as follows: 25 to 45 lb. sections, 1.70c.; 16 and 20 lb., 1.75c.; 12 and 14 lb., 1.80c.; 8 and 10 lb., 1.85c., in carload lots. An advance of 5c. per 100 lb. is charged for less than carloads and down to three tons, while under three tons an additional 5c. is carged. We quote standard section rails of Bessemer stock at 1.25c. and of open-hearth steel, 1.34c., Pittsburgh.

Sheets.—The demand for blue annealed and black and galvanized sheets is much beyond the capacity of the mills to supply as promptly as customers desire. Most mills are sold up to July, and customers are now insisting that their orders be accepted for second half delivery, but so far the mills have refused to take this business, except in the case of a few specialties on which it is necessary for consumers to know prices to be charged to them over the entire year. In the second quarter, the mills anticipate the demands made on them for deliveries by customers will be enormously heavy, and premiums for reasonably prompt shipments will no doubt rule. All sheet mills are running practically 100 per cent., but in some cases are hampered by slow deliveries of sheet bars. Nearly all the mills are now charging $2 per ton advance for sheets from open-hearth stock over Bessemer. For delivery in second quarter we quote: Nos. 9 and 10 blue annealed sheets, 2.65c. to 2.75c.; No. 28 Bessemer black, 2.60c.; open-hearth, 2.70c.; No. 28 galvanized sheets from Bessemer stock, 4.75c., and from open-hearth, 4.85c., at maker's mill. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A. 2.40c.; Nos. 25, 26 and 27, 2.45c.; No. 28, 2.50c.; No. 29, 2.60c., and No. 30, 2.70c. These prices are for carloads and larger lots, f.o.b. maker's mill, but some makers are quoting higher figures.

Tin Plate.—All consumers are under contract, and in buying their tin plate in the open market, for shipment from stock, three of the leading mills have put their price at $4 per box, and sales have been made at this figure. All the mills have their output sold up to July or August, and specifications are coming in at an enormous rate. Nothing further has been heard in regard to the export inquiry for 360,000 boxes, but it is possible this business may be placed with domestic mills. The export inquiry continues heavy, but no large orders have lately been placed. In nearly all cases export tin plate brings 25c. per box or more over the domestic price. While the nominal price of tin plate remains at $3.75, the actual price is $4, and several leading mills will firmly establish this figure before the week is out.

Railroad Spikes.—Prices have again been advanced, not because of any heavy demand, but in sympathy with the higher market on steel. The new demand for some time has been quiet, and specifications have been dull. This does not worry the spike makers, as any falling off in output would simply mean that the steel would be used in making other products. We quote:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.35; railroad spikes, ½ and 7/16 in., $2.50 base; railroad spikes, ⅜ in. and 5/16 in., $2.60 base; boat spikes, $2.50 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Rods.—Sales to domestic consumers have been made at $50 per ton at makers' mill. Local makers have not had any rods to spare for a long time, and in fact are not able to give regular customers more than about half the amount they want. Little is being done in export business, as domestic mills are sold up so far ahead they cannot make the deliveries wanted on these inquiries. We now quote Bessemer, open-hearth and chain rods at $50 per ton, f.o.b. makers' mill.

Skelp.—The great activity in the pipe trade is reflected in a very heavy demand for skelp, the mills being sold up for three or four months, and prices are higher. We now quote: Grooved steel skelp, 2c. to 2.05c.; sheared steel skelp, 2.10c. to 2.15c.; grooved iron skelp, 2.40c. to 2.45c., and sheared iron skelp, 2.50c. to 2.55c., all delivered to consumers' mills in the Pittsburgh district

Wire Products.—The anticipated advance of $2 per ton in wire products was made effective from Monday, Feb. 14, and puts the prices of wire nails and wire at the highest figures known for many years. The new demand is enormous, and much beyond the capacity of the mills to furnish. However, specifications in the past week for wire products were not as heavy as usual, and the mills welcome this, as they feel it will give them a chance to catch up on deliveries to some extent on which they are very far behind. Discounts on woven wire fencing were also lowered one point. Prices quoted by the mills to the large trade only, on which shipments would not be promised inside of three or four months, are as follows: Wire nails, $2.30; galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50; plain annealed wire, $2.15; galvanized barb wire and fence staples, $3.15; painted barb wire, $2.45; polished fence staples, $2.45; cement coated nails, $2 base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are one point lower and are now quoted at 63½ per cent off list for carload lots; 62½ per cent for 1000-rod lots and 61½ per cent for small lots, f.o.b. Pittsburgh.

Hoops and Bands.—The new demand is abnormally heavy, and specifications are being received by the mills very freely, and they have all the hoops and bands under contract that they will turn out in the next four or five months or longer. We now quote steel hoops at 2.25c. and steel bands at 2.10c., with extras on the latter as per steel bar card. These are prices quoted by the mills for such delivery as they can make, which would likely be in the second half.

Shafting.—Discounts have again been lowered five points, equal to an advance of about $5 per ton, and the makers have nothing to sell on new orders for delivery inside of five or six months, the new discount of 40 per cent off in carloads representing what the customer would have to pay if he would take a chance and place an order for such delivery as the mill could make. Specifications are enormously heavy, and the supply of shafting is very short of being enough to go around. Most consumers are not getting more than half, if that much, of the shafting called for in their contracts. We quote cold-rolled steel shafting at 40 per cent off in carloads and 35 per cent in less than carloads, f.o.b. Pittsburgh district.

Iron and Steel Bars.—The mills are swamped with business, and it would be impossible to place any fair sized order for steel bars for fairly prompt shipment at less than 2.25c., maker's mill. Export inquiry for steel rounds for shrapnel is still very heavy, but local mills are taking little of this business, being filled for months. The new demand for iron bars is also very heavy, and mills are running about 100 per cent of capacity, and back in orders for several months. We quote steel bars at 2c. for delivery in third and fourth quarters, 2.25c. to 2.50c. for shipment between now and July, and 2.40c. to 2.50c. for delivery from warehouse. We quote refined iron bars at 2.15c. to 2.20c., and railroad test bars, 2.25c. to 2.30c., f.o.b. mill, Pittsburgh.

Merchant Steel.—In spite of their efforts to meet the demand by running to utmost capacity, and shipping out their product as fast as made, mills are back in deliveries 10 to 12 weeks or longer. There are no regular prices, premiums of $3 to $5 per ton or more being readily paid for fairly prompt shipments. On small lots for delivery at convenience of mill, which might mean

three or four months, we quote: Iron finished tire, ½ x 1½ in. and larger, 2.05c., base; under ½ x 1½ in., 2.20c.; planished tire, 2.25c.; channel tire, ¾ to ⅞ and 1 in., 2.55c. to 2.65c.; 1 x ⅛ in. and larger, 2.95c.; toe calk, 2.65c. to 2.75c., base; flat sleigh shoe, 2.40c.; concave and convex, 2.45c.; cutter shoe, tapered or bent, 2.95c. to 3.05c.; spring steel, 2.65c. to 2.75c.; machinery steel, smooth finish, 2.45c.

Nuts and Bolts.—The export and domestic demand continues heavy, and makers of nuts and bolts have their output sold up for five to six months, and are much back in their deliveries. Domestic consumers are getting slightly better deliveries on account of the railroad embargo on foreign shipments. Discounts now in effect, but for forward delivery only, are as follows:

Carriage bolts, small, rolled thread, 70 per cent off; cut thread, 65 and 10; large, 60 and 5. Machine bolts with h.p. nuts, small, rolled thread, 70 and 5; cut thread, 70; large, 60 and 10. Machine bolts with c.p.c. and t. nuts, small, 65 and 5; large, 60. Bolt ends with h.p. nuts, 60 and 10; with c.p. nuts, 60. Blank bolts, 60 and 10. Lag screws (cone or gimlet point), 70 and 10. Rough stud bolts, 50. Forged set screws and tap bolts, 35. H.p. sq. nuts, tapped or blank, $4 off list; h.p. hex., $4.20; c.p.c. and t. sq. nuts, tapped or blank, $3.75; c.p.c. and t. hex, $4.75. Semi-finished hex. nuts, 75 and 10. Finished and case hardened nuts, 75. Rivets, 7/16 in. diameter and smaller, 70 and 10. These prices are delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.

Cold-Rolled Strip Steel.—Makers have their product sold up for five or six months and are very much behind in deliveries. Premiums are freely paid for fairly prompt shipments. All the mills are now charging 15c. for boxing material, and the same price for burlapping. We quote cold-rolled strip steel at $4 base for delivery at convenience of the mill, extras which are standard with all the makers being in part as follows:

Base price for 1½-in. and wider, hard, in coils, 0.10 to 0.19 carbon. Extras for size, annealing, cutting, etc., as follows:

	0.100-in. and thicker	0.050-in. to 0.099-in.	0.036-in. to 0.049-in.	0.035-in.	0.031-in. to 0.034-in.	0.026-in. to 0.030-in.	0.025-in.	0.020-in. to 0.024-in.
Thickness								
Extra for thickness	...	.05	.20	.20	.35	.45	.45	.55
Extra for annealing	.25	.25	.25	.25	.40	.40	.40	.40
Width Extras								
Under 1¼ to 1-in. inc.	.15	.15	.15	.15	.15	.15	.15	.15
Under 1 to ¾-in. inc.	.30	.30	.30	.30	.30	.30	.30	.30
Wider than 6, not over 9-in.	...	...	...	...	...	...	.25	.25
Wider than 9, not over 12-in.	...	...	...	.25	.25	.25	.50	.50
Wider than 12, not over 15-in.	...	...	...	.50	.50	.50	...	...
Cut Lengths Extra								
1-in. and wider	.10	.15	.15	.15	.25	.40	.40	.50
Under 1-in. to our limits	.25	.50	.50	.50	.75	.75	.75	.75

Reductions for carload lots of a size. For orders 18 tons or over, one width and gage, shipment at one time, there is a regular reduction from the net price of 15c. per cwt.

For all tempers other than full hard for flat work add annealing extra.

Carwheels.—It is said that two local makers have their output of steel carwheels practically sold up for the remainder of this year. We quote 33-in. freight carwheels in lots of 1000 or more at $18; 33-in. tender wheels, $21; 36-in. passenger or tender wheels, $25. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

Rivets.—Several makers have again advanced prices $2 per ton, but this is not general as yet. The new export and domestic demand is very heavy, and makers are back in shipments eight to ten weeks or longer. They claim that deliveries of steel from the mills are very unsatisfactory and that they are not getting more than about one-half the material called for in their contracts. We quote button-head structural rivets, ½ in. and larger, at $2.70 to $2.80, and cone-head boiler rivets at $2.80 to $2.90 per 100 lb., in carload lots, f.o.b. Pittsburgh, smaller lots bringing about 10c. advance.

Wrought Pipe.—Effective Tuesday, Feb. 15, discounts on black and galvanized iron and steel pipe were lowered one point, equal to an advance of $2 per ton, with the exception that on lap-weld steel pipe, sizes 13, 14 and 15 in., discounts were not advanced. The very heavy demand for both steel and iron pipe, and also the scarcity of steel and the higher prices for skelp, are given as the reasons for this latest advance. The pipe mills are running to about 100 per cent of capacity, and are shipping out their product as fast as made. The new discounts now in effect will be found on another page.

Boiler Tubes.—An advance in prices is looked for in the near future. Mills have their output sold up for three or four months and are much back in deliveries. Discounts on iron and steel tubes are given on another page.

Old Material.—The local market continues quiet, and prices on some grades of scrap, notably borings and turnings, are lower. There is a fair demand for heavy steel scrap, and also for low-phosphorus melting stock, but prices are only fairly strong. Consumers seem to have all the scrap they will need for the present at least, and are not buying very actively. They have reduced prices on borings and turnings 50c. per ton. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Blackenridge, Sharon, Monessen, Midland and Pittsburgh delivered	$17.00 to $17.25
Compressed side and end sheet scrap	16.25 to 16.50
No. 1 foundry cast	15.75 to 16.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	14.50 to 15.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	18.00 to 18.25
No. 1 railroad malleable stock	15.50
Railroad grate bars	10.75 to 11.00
Low phosphorus melting stock	20.00 to 20.50
Iron car axles	24.50 to 25.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	24.00 to 24.50
No. 1 busheling scrap	15.00
Machine shop turnings	9.25
Old carwheels	14.50
Cast-iron borings	10.25
*Sheet bar crop ends	18.00 to 18.50
Old iron rails	16.00 to 16.50
No. 1 railroad wrought scrap	18.50 to 19.00
Heavy steel axle turnings	13.50 to 14.00
Heavy breakable cast scrap	13.50 to 14.00

*Shipping point.

Coke.—There is another shortage in the supply of cars, with the result that prices on furnace coke for prompt shipment are higher, and it is held at $3.75 to $4 per net ton at oven, but there is very little demand. There is no inquiry for contract blast-furnace coke, and foundry is also quiet. We quote best grades of blast-furnace coke for spot shipment at $3.75 to $4, and on contracts at $2.60 to $2.75 per net ton at oven. We quote best grades of 72-hr. foundry coke for prompt shipment at $3.50 to $3.75; on contracts $3.25 to $3.50 per net ton at oven. The Connellsville *Courier* reports the output of coke for the week ended Feb. 5 as 433,182 net tons, a decrease over the previous week of 9434 tons.

Cincinnati

CINCINNATI, OHIO, Feb. 15, 1916.—(*By Wire.*)

Pig Iron.—Some improvement is noted in the demand for malleable. One inquiry from Indiana calls for 3000 to 5000 tons for last half shipment. A few small orders are also pending. A Michigan melter is inquiring for 1500 tons of Northern foundry and a consumer in central Ohio wants approximately 1000 tons of Southern foundry. An inquiry is also out in this territory for 500 tons of Virginia iron. Sales are light and scattered. None in this immediate vicinity will go above 500 tons. Pig-iron merchants state that a comparatively small percentage of last half foundry iron has been purchased and they expect consumers to enter the market at an early date. Shipments on contracts are going forward at a good rate, although some basic users are said to have lately experienced a few delays due to different causes, but at present they are making no complaints. Ohio silvery irons are inactive but firm at $25 at furnace based on an 8 per cent analysis. Southern No. 2 foundry can still be obtained at $14.50, Birmingham basis, for first half shipment, but most sales made are at $15. Northern iron is unchanged and strong at $18, Ironton. Based on freight

rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$18.40 to $18.90
Southern coke, No. 2 f'dry and 2 soft	17.90 to 18.40
Southern coke, No. 3 foundry	17.40 to 17.90
Southern No. 4 foundry	16.90 to 17.40
Southern gray forge	16.40 to 16.90
Ohio silvery, 8 per cent silicon	26.26 to 26.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.26 to 19.76
Basic, Northern	19.26 to 19.76
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	25.40 to 25.90

(*By Mail*)

Coke.—Coke is moving forward at a more satisfactory rate and Connellsville prices on prompt foundry coke are still settling. It is now obtainable at $3.75 per net ton at oven and contract figures range from $3.25 to $3.75. Furnace coke for nearby shipment is around $3 to $3.50 per net ton at oven, and contract figures run all the way from $2.25 to $2.60. Wise County and Pocahontas furnace coke continues to be quoted at $2.75 to $3 and standard foundry grades from $3.30 to $3.75.

Finished Material.—Store prices have been advanced all along the line and we now quote steel bars from jobbers' stocks at 2.70c. base; flats, 2 in. and over, 2.95c.; rounds, 2 in. and larger, 3.20c.; twisted steel bars, 2.85c.; plates, 2.85c.; structural shapes, 2.70c.; No. 10 blue annealed sheets, 3.10c., and No. 28 galvanized sheets at a minimum of 5c. The mill price on No. 28 galvanized remains at 5.15c., Cincinnati, or Newport, Ky., and on No. 28 black, 2.65c. Wire nails from jobbers' stocks are unchanged at $2.30 per keg base and barb wire at $3.20 per 100 lb.

Old Material.—The market is weaker and prices have been reduced 25c. per ton. Yard stocks are increasing, as inbound shipments are ahead of scrap moving outbound. The minimum prices given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards.

Per Gross Ton

Bundled sheet scrap	$10.25 to $10.75
Old iron rails	15.00 to 15.50
Relaying rails, 50 lb. and up	20.50 to 21.00
Rerolling steel rails	13.75 to 14.75
Heavy melting steel scrap	13.75 to 14.25
Steel rails for melting	13.50 to 14.50

Per Net Ton

No. 1 railroad wrought	$13.00 to $13.50
Cast borings	7.00 to 7.50
Steel turnings	6.75 to 7.25
Railroad cast scrap	11.25 to 11.50
No. 1 machinery scrap	13.00 to 13.50
Burnt scrap	8.25 to 8.75
Iron axles	18.75 to 19.25
Locomotive tires (smooth inside)	12.75 to 13.25
Pipes and flues	9.75 to 10.25
Malleable and steel scrap	10.25 to 10.75
Railroad tank and sheet scrap	8.25 to 8.75

St. Louis

ST. LOUIS, MO., Feb. 14, 1916.

Pig Iron.—Buying of pig iron increased considerably during the week, with evidences of further incursions into the market in the near future as a result of the developing willingness of furnaces to take more business for the last half. While a large proportion of the sales made ranged from 300 tons down for various deliveries, the aggregate was of quite handsome characteristics. The 1200-ton inquiry for basic reported last week remains unplaced owing, seemingly, to the sold-up conditions on this metal. Ferromanganese is scarcely quotable, being strictly at value at the time of sale and that in very small lots. Ferrosilicon is very strong. Spiegeleisen is also sharply higher.

Coke.—Quotations in this market are erratic, due to the car shortage and embargo conditions. Sales have been made at $5 per ton and over, at Connellsville oven, for immediate shipment, while contracts have been made at $4 for last half for best 72-hr. selected foundry. The local by-product coke is not interfering with the higher prices at present because of the sold-up condition of the ovens for the next six months.

Finished Iron and Steel.—In finished products there has been considerable quickening of business, though it continues to be in small lots, with the buying largely based on specific needs. Fabricators report an improving condition of architects' boards, with present work such as to keep them satisfactorily busy. Bars are wanted but not available to any extent. Movement of warehouse stock continues very active at these prices: Soft steel bars, 2.65c.; iron bars, 2.60.; structural material, 2.65c.; tank plates, 2.85c.; No. 10 blue annealed sheets, 3c.; No. 28 black sheets, cold rolled, one pass, 3.20c.; No. 28 galvanized sheets, black sheet gage, 5.25c.

Old Material.—Dealers are holding firmly, though the blockade at the mills has not lessened and the embargoes have not been lifted. It is expected that consumption, which is going on at a heavy rate, will bring about a disposition to receive material very shortly, and such a development will start prices to rising again. No new lists appeared, but the lists previously reported were closed during the week at higher prices, practically all the material going to Eastern bidders who seemed inclined to pay higher prices for the railroad scrap offered. Relayers are in especially good demand, both light weight and standard section. They are also hard to get. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$15.25 to $15.75
Old steel rails, rerolling	16.50 to 17.00
Old steel rails, less than 3 ft	16.25 to 16.75
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	13.25 to 13.75
No. 1 railroad heavy melting steel scrap	14.75 to 15.25
Heavy shoveling steel	13.00 to 13.50
Frogs, switches and guards cut apart	14.75 to 15.25
Bundled sheet scrap	9.75 to 10.25

Per Net Ton

Iron angle bars	$14.75 to $15.25
Steel angle bars	13.00 to 13.50
Iron car axles	19.75 to 20.25
Steel car axles	20.75 to 21.25
Wrought arch bars and transoms	16.75 to 17.25
No. 1 railroad wrought	14.25 to 14.75
No. 2 railroad wrought	13.75 to 14.25
Railroad springs	14.25 to 14.75
Steel couplers and knuckles	14.25 to 14.75
Locomotive tires, 42 in. and over, smooth inside	14.25 to 14.75
No. 1 dealers' forge	11.75 to 12.25
Mixed borings	7.75 to 8.25
No. 1 busheling	12.25 to 12.75
No. 1 boilers, cut to sheets and rings	9.75 to 10.25
No. 1 railroad cast scrap	11.75 to 12.25
Stove plate and light cast scrap	9.25 to 9.75
Railroad malleable	11.25 to 11.75
Agricultural malleable	9.75 to 10.25
Pipes and flues	9.75 to 10.25
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	9.25 to 9.75
Machine shop turnings	9.25 to 9.75

Birmingham

BIRMINGHAM, ALA., Feb. 14, 1916.

Pig Iron.—With here and there some superficial indications of less confidence, the Birmingham furnace operators as a rule adhere to the pace set by the leading interest, which continues to quote $15 and $16 for first and second halves with a very distinct statement that there will be no undercutting. It is true that Middle Western offices of one Birmingham manufacturer sold several lots of 100 to 250 tons during the week at $16 for the second half, and that 3500 tons of special iron was sold at $17.50, which is on the basis of $16 for ordinary foundry, for second half; but, on the other hand, sales were made for second half at $15.50 by a regular foundry producer. The statement was made by a strictly Southern buyer, who was offered spot iron at $15, that he could supply his needs at $14.50, but this is denied. Tennessee iron and perhaps some warrant iron are selling under the Birmingham $15 basis for spot delivery, but if that is the case it is exceptional and is not the position of Southern furnaces generally. The Republic Company has no spot to offer under $15.50 and no second half under $16. To reiterate, the market is, generally speaking and so far as furnace iron is concerned, on a basis of $15 to $15.50 for spot and $15.50 to $16 for second half. The few sales for second half made at $16.50 do not reflect general conditions. Sales during the week showed an increase over the previous week and, while the market is still

quiet, indications of a buying movement are thought to be better. Iron is being freely offered in the Chattanooga district at $14.50, Birmingham basis. One Chattanooga stack is not participating but is receiving for its output $15 in Northern and Western markets. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.50 to $16.00
No. 2 foundry and soft	15.00 to 15.50
No. 3 foundry	14.50 to 15.00
No. 4 foundry	14.25 to 14.75
Gray forge	14.00 to 14.50
Basic	15.00 to 15.50
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—A fair amount of new business has been coming in, and there is every reason to expect a continuance of the present rate of manufacture for some time. Anniston pipe plants are reported busy with recent shipments made to South America. The United States Cast Iron Pipe & Foundry Company is nearing the completion of its two remaining pits in the remodeled Bessemer plant. The five pits will have a capacity of 150 tons each, giving the plant a capacity of 750 tons. We quote, per net ton, f.o.b. yards, as follows: 4-in., $27; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths. The tendency to raise quotations is marked.

Coal and Coke.—Interest in Warrior River coal traffic was intensified the past week when the general agent of the Louisville & Nashville Railroad, testifying before the Public Utilities Commission at Montgomery, admitted the competition and declared that his railroad, in protection, was contemplating the building of a short line from Helena to Mobile. Independent operators are gradually recouping owing to the retiring of the iron operators from the field. Coke continues high and scarce, with iron makers active in resuming at beehive ovens. Yolande and Brookwood beehive foundry sells at $4 and $3.75 per net ton, respectively, with furnace coke, of which none is available, at $2.75 to $3.

Old Material.—The demand for steel scrap is much stronger. A generally better tone prevails in the scrap market. Inquiry is brisk and the volume of business is increasing. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$14.50 to $15.00
Old steel axles	14.00 to 14.50
Old iron rails	13.50 to 14.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 country wrought	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.00 to 10.50
Tram carwheels	10.00 to 10.50
Stove plate	8.00 to 8.50

San Francisco

SAN FRANCISCO, CAL., Feb. 8, 1916.

The general demand continues active, both for special purposes and routine requirements, although the usual spring movement is not yet well under way. Most regular buyers are making liberal provision for future needs, and are getting a fair tonnage on old contracts. On a great deal of new business, however, early delivery is urgently desired, and the consequent heavy withdrawals from local stocks are already causing a depletion in many lines. Export inquiries continue numerous, but the volume of such business actually placed is decreasing.

Bars—Jobbing stocks have thus far been kept up in fair shape, as a substantial tonnage is coming from the East on specifications, and local mills are also taking care of the situation, with the expiration of some other old contracts. The distributive movement is fairly active, and a material increase is assured as soon as the weather settles. Manufacturers having contracts with mills are specifying their full quota, and a good many special inquiries are appearing, both for plain and reinforcing bars. Prices are firmly held, local mills getting 2.60c., while small lots from store are quoted at 3.35c.

Structural Material—Contracts for large buildings are coming through less promptly than was expected, being retarded by price and delivery conditions, but there is considerable work in sight that cannot be long delayed. The destruction of many bridges by flood in southern California will require a heavy tonnage for reconstruction, and negotiations for a part of the material are said to be already under way. The Central Iron Works has a small church job in this city, and the Vulcan Iron Works has about 500 tons for a theater on Ellis Street. Plans are being drawn for a 12-story building at California and Montgomery streets, which is expected to go ahead soon; and the Spreckels Building annex is being removed to make way for an 8-story structure. The Brode Iron Works has a small hotel job at Pittsburg, Cal. Local fabricators are greatly hampered for lack of material.

Rails—A few fairly large foreign inquiries have appeared recently, but there seems to be some difficulty in placing the orders. Orders from the lumber trade are showing up in good shape, though usually small, and there is a fair demand for mine and industrial rails. It is expected that a 260-mile road between Eureka, Cal., and Coes Bay, Ore., will be built in the near future. A general construction contract has been closed for the Hetch Hetchy railroad.

Plates—While the larger shipbuilders are well occupied, inquiries continue to appear, and the demand for material shows scarcely any curtailment. Tank builders also continue actively in the market for oil storage construction. The tonnage available for second quarter shipment is very light and closely held, and most of the business now is for third quarter. Small local trade is active, and stocks are somewhat broken, though the small shop demand in the country has hardly started. Mill prices are quoted at 2.75c. to 3c., Pittsburgh, the local jobbing price being 3.60c.

Sheets—Blue annealed sheets continue in strong demand, both for routine requirements and special purposes, and specifications are exceptionally heavy, new business being hard to place. Deliveries on contracts are coming in slowly, and supplies on hand are very light. The resale price for small lots has been advanced to 4c. basis for No. 10. There is little call for corrugated sheets, but flat galvanized are moving well.

Wrought Pipe—The recent advance at the mills has been followed by local merchants, and has had a slightly stimulating effect on business. Oil-country goods and lap-weld pipe in general are quite active, and heavier buying is expected when the weather permits hauling in the oil fields. Merchants are keeping their stocks of small pipe in good shape, but the consuming demand remains rather quiet. Boiler tubes are in strong demand.

Cast-Iron Pipe—New projects are coming up slowly in this vicinity, but northern business is picking up. The town of Bellingham, Wash., is in the market for about 200 tons of 4 and 6 in. pipe. Efforts are being made to have a high-pressure fire protection system installed at Seattle, Wash. Bids are being taken for the Wailuku-Kahului waterworks, Maui, T. H. The Pacific Gas & Electric Company is figuring on a gas plant at Livermore, Cal. Newport Beach, Cal., has taken figures on a few cars of small pipe. Prices remain at $35 per net ton for 6-in. and over; $38 for 4-in., and $1 extra for class A and gas pipe.

Pig Iron—The local melt is gradually increasing, but most of the foundries now have their requirements pretty well covered for the year, and contracting has been a little less active for the last fortnight. No. 1 Southern foundry iron remains at about $27 per gross ton for first half, and $27.50 for second half.

Coke—The heavy contracting movement seems to be over for the present, as the principal requirements have been provided for, extending many months into the future. Some new contracts are still being closed, however. Southern foundry coke is held here at $16 per net ton.

Old Material—Local steel mills continue to get plenty of scrap for their requirements at the range of $8 to $11 per gross ton, though there are still some stocks being held for an advance. Cast-iron scrap is moving fairly well, but there is plenty on the

market, and values remain at about $12 to $14 per net ton.

Ore—R. C. Chappel and associates of St. Louis, Mo., have signed a contract with D. A. Vaughn, Porterville, Cal., for the delivery of 16,000 tons of chromite iron ore from Vaughn's land, near that place.

New York

NEW YORK, Feb. 16, 1916.

Pig Iron.—The market continues quiet, but it is believed that a buying movement of considerable proportions is not far away. Very recently sales of lots of fair proportions, aggregating several thousand tons, have been made involving all grades of iron, but principally foundry. Inquiries amounting to about 5000 tons are before the market. While the situation is generally strong, some resale Buffalo foundry iron has been sold at $18 to $18.50 and some instances are noted where furnacemen have definitely made small inducements to foundries to take iron, because New England customers were inaccessible, due to railroad embargoes. The New Haven embargo is lifted, but the situation as to deliveries is still bad. Wherever possible, foundries are urged to ship finished castings out in cars in which they receive their raw materials. About forty carloads of iron await shipment at Norfolk via the Merchants & Miners' Steamship Line to New England. The Pennsylvania embargo is still on. We quote at tidewater as follows for early delivery: No. 1 foundry, $20.25 to $20.75; No. 2 X, $19.75 to $20; No. 2 plain, $19.25 to $19.50; Southern iron at tidewater, $20 to $20.50 for No. 1 and $19.50 to $20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—British producers of ferromanganese have advanced their quotation $25 per ton to $150, seaboard, at which price about 8000 to 10,000 tons have been very recently sold for delivery after July 1, subject to the usual licenses and restrictions. There are substantial inquiries before the market, but anxiety as to future supplies is confined to certain consumers who are short and not covered by contracts. Deliveries of foreign alloy on contracts are from four to six weeks behind schedule, due either to shipping difficulties or to temporary lack of ore in England. Receipts in January are certain to have equaled if not exceeded the average monthly receipts in 1915. Some sales of moderate tonnage of British alloy have recently been made at $170 for delivery in March and April. Spot material in small lots has brought as high as $225, seaboard, and more could be sold at this price or higher. Not much is heard of domestic ferromanganese, makers being sold up for some time to come and the production being lower now than for some months, which is not a reassuring factor. A rumor is current that a new domestic producer is about to enter the market. There are substantial inquiries for spiegeleisen, but not enough available to meet the demand. The quotation has been advanced to $40, furnace, at which price some sales are noted. Ferrosilicon, 50 per cent, is in continued strong demand, with inquiries now from France, the country where it was first produced. The supply is inadequate, the last quotations being $84 to $86, Pittsburgh, with as high as $90 to $96 obtained.

Structural Material.—Large jobs are still shy in making an appearance but going work of an urgent nature usually requires payment for plain material at prices ranging from 2.25c., Pittsburgh, to 2.70c., the present charge out of warehouse. As yet high steel costs cannot be said to be a factor in the relatively light demand locally. Steel is hard to get in less than 8 weeks and yet fabricators could take on a large increase of business, so far as their shops are concerned. There is no special color to the demand but plant extensions of individually small size are expected to continue a feature with an increase in buying for railroad bridges. Some of the late building awards include 1400 tons for the Ten Eyck hotel, Albany, placed with the Ferguson Iron & Steel Company; 900 tons for the M. Crystal loft, 38 East Thirty-third Street, taken by the Passaic Structural Steel Company; 500 tons for an institution for the feeble-minded at Spring City, Pa., closed with the Pittsburgh Bridge & Iron Company; 400 tons for an immigrant station for the Pennsylvania Railroad at Philadelphia, given to the Jones & Laughlin Steel Company; 600 tons for the Ammo-Phos. Company, Carteret, N. J., awarded the Belmont Iron Works; 235 tons for Syracuse University's Agricultural College, to be erected by the Smith & Caffrey Company; 125 tons each for the Nicolini garage, Dorchester, Mass., and the Gryzmisch garage, Allston, Mass., both placed with the Hedden Iron Construction Company; 200 tons for reinforcing a floor of the Equitable Building, New York, for the Federal Reserve Bank, to sustain a load of 3600 lb. per square foot, to be done by the Hay Foundry & Iron Works; 200 tons for the Paterno garage, East Sixty-seventh Street, placed with the J. Klein Iron Works, and 100 tons for the Hackensack post office, taken by the Communipaw Steel Company. The American Bridge Company, it is expected, will supply the 4200 tons for the West Forty-sixth Street pier. An office building at Fifth Avenue and Forty-third Street, 700 tons, is up for figures, and a round tonnage of column cores is expected from the Turner Construction Company for buildings 9 and 10 of the Bush terminal warehouses, Brooklyn. The Phoenix Bridge Company has taken 500 tons at Rochester and 1200 tons at Lyons, N. Y., for the New York Central for barge canal bridges, and the American Bridge Company, 300 tons for the Erie, mostly in Indiana. Plain material is obtainable from the mill in eight and more weeks at 2.169c. to 2.269c., New York, depending on the urgency of shipment, but from the warehouse at 2.70c., New York.

Steel Plates.—Demand is insistent from shipbuilders and jobbers and for export, and round tonnages have been sold at 3c., Pittsburgh, for delivery in the second half. Attractive lots, not necessarily very large, have sold for 2.75c., Pittsburgh, for somewhat early shipment, but the higher price is the common one with those mills which will consider new business. Pressure to consider future contracts meets with requests to postpone consideration for a few weeks or until mills can catch up on the oversold condition. We quote mill shipments of plates at 2.919c. to 3.169c., New York, in say six weeks and 2.269c. to 3.169c. for delivery in the third quarter. From warehouse plates are now 3.25c., New York, the advance intimated last week coming shortly after the issue went to press.

Iron and Steel Bars.—Steel bars for delivery in the first half are scarce, so far as the mills are concerned, and prompt material must come from the warehouses or, if bar iron will do, from iron rolling mills with several weeks required for delivery. By not taking orders some of the steel mills are catching up and are preparing for the far future domestic business for which buyers are urging consideration and for the avalanche of inquiry from neutral nations which it is expected will shortly develop. Bar iron mills are finding ready acceptance of prices even slightly above the general market. We quote steel bars at 2.169c., New York, for shipment sometime in the last half and mill shipments of bar iron at 2.419c., New York. The store price is 2.70c., New York.

Cast-Iron Pipe.—Albany, N. Y., will open bids Feb. 21 on about 565 tons of 6 and 8-in. Pittsfield, Mass., is expected to purchase a quantity of water pipe some time next week. The letting at Worcester, Mass., 747 tons, went to the leading interest at $33, delivered, for 4-in., and $30 for 6 to 20-in. The same company secured the award at Pawtucket, R. I., 455 tons, at $32.25 for 4-in. and $29.25 for 8 to 16-in. While municipal lettings continue to be few in number, private buying goes on apace, with fresh inquiries continuing to come out. Carload lots of 6-in., class B and heavier, are quoted at $29.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—The only change in the situation is an appearance of weakness in wrought scrap. Dealers continue to be hampered by railroad embargoes. These are shifting every few days, but when an embargo at one point is raised another goes into effect somewhere else. The consumption of scrap continues heavy, and the belief is general that if the railroad situation should become normal a stimulating effect would at once be felt in the demand. Brokers are paying about as

follows to local dealers and producers, per gross ton, New York:

No. 1 heavy melting steel scrap	$14.00 to $14.50
Relaying rails	.... 23.50
Rerolling rails	15.00 to 15.50
Iron car axles	25.00 to 25.50
Steel car axles	24.00 to 24.50
No. 1 railroad wrought	19.50 to 20.00
Wrought-iron track scrap	17.00 to 17.50
No. 1 yard wrought, long	15.50 to 16.00
No. 1 yard wrought, short	14.00 to 14.50
Light iron	6.50 to 6.75
Cast borings	8.50 to 8.75
Wrought turnings	7.50 to 7.75
Mixed borings and turnings	6.50 to 6.75
Wrought pipe	13.25 to 13.50
Old carwheels	14.00 to 14.50
Malleable cast (railroad)	12.50 to 13.00

Foundries still present the bright spot in the old material market. Inquiries are good and transactions are numerous, with prices strongly maintained. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$17.00 to $17.50
No. 2 cast (heavy)	16.00 to 16.50
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

British Market Strong

American Rails for South Africa—Pig-Iron Warrants Still Advancing

(*By Cable.*)

LONDON, ENGLAND, Feb. 16, 1916.

Increased speculative operation in pig-iron warrants is responsible for an advance of nearly 4s. Hematite iron is firm and increasingly scarce at 140s. for early delivery and 135s. and upward for forward delivery. Finished steel is at a standstill except for Government work. The markets are awaiting further decisions regarding maximum prices, but in the meantime quotations are entirely nominal. It is reported that America has booked 12,000 tons of rails for South Africa. Prices of a few commodities are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 25s. 6d.

Cleveland pig-iron warrants, 96s. 4d., as compared with 92s. 5d. last week.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 76s. 9d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £19.

Steel ship plates, Scotch, delivered local yards, £13 5s.

Steel rails, export, f.o.b. works port, £11.

Hematite pig iron, f.o.b. Tees, about 135s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £12 5s.

Ferromanganese, f.o.b., £25, loose.

Ferrosilicon, 50 per cent, c.i.f., £27.

American Semi-Finished Steel in Great Britain

Great Britain continues to take large quantities of billets, blooms and slabs from the United States, even at record prices. Imports from this country in Great Britain in December last, according to official data, were 19,440 gross tons against only 5595 tons in December, 1914. The total from this country in 1915 was 349,046 tons, valued at £2,262,297, or about £6½ per ton. These imports compare with only 30,228 tons in 1914. The total British imports of billets, blooms and slabs in 1915 was 427,996 tons against 298,736 tons in 1914. For the 17 months of the war Great Britain has taken 358,388 tons as compared with only 33,101 tons for the same months the year before.

Dissolution of the Russian Steel Syndicate

The Russian Iron and Steel Syndicate, the Prodametа, expired on Jan. 12, 1916, because negotiations for a renewal failed. Several members were inclined to withdraw because they considered the syndicate a depressing influence on the market. It consisted of nineteen works, one in Petrograd, one in Moscow, one in the Urals and the rest in South Russia.

Iron and Industrial Stocks

NEW YORK, Feb. 16, 1916.

International relations have again played a somewhat important part in adversely affecting values of securities, the attention of speculators and investors turning quite conspicuously to copper stocks, in which this influence lacked ability to exert much power. Iron and industrial stocks, as well as railroad stocks, touched lower prices than in the preceding week. Pennsylvania Steel was a conspicuous exception, rising sharply under the stimulus of rumors that the company would be taken over by the Bethlehem Steel Company. Crucible Steel common also advanced as the result of heavy buying. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	30¼- 33¼	Republic, com.	53¼- 54⅞
Allis-Chal., pref.	81⅛- 82⅝	Republic, pref.	110 -110¼
Am. Can, com.	61½- 64	Sloss, com.	59⅞- 61
Am. Can, pref.	109½-111	Sloss, pref.	98
Am. Car & Fdy., com.	70 - 74½	Pipe, com.	18⅝- 20½
Am. Car & Fdy., pref.	117½-117¾	Pipe, pref.	49⅛- 49⅞
Am. Loco., com.	65⅜- 68¾	U. S. Steel, com.	83¼- 85⅝
Am. Loco., pref.	102¼-103	U. S. Steel, pref.	116¾-117½
Am. Steel Fdries.	56½- 58	Va. I. C. & Coke	58⅞- 59½
Bald. Loco., com.	111⅛-116¼	Westing. Electric.	67 - 68⅛
Bald. Loco., pref.	108⅞-109	Am. Rad., com.	395
Beth. Steel, com.	468 -475	Am. Ship, com.	38 - 39
Beth. Steel, pref.	133 -140	Chic. Pneu. Tool.	73 - 74¾
Colorado Fuel	45½- 49⅛	Cambria Steel	80 - 81
Deere & Co., pref.	97 - 98½	Lake Sup. Corp.	9¾- 12½
Gen. Electric	170½-172¾	Pa. Steel, com.	62 - 63
Gt. No. Ore Cert.	45⅝- 47¾	Pa. Steel, pref.	80 - 95
Int. Harv. of N. J., com.	110⅛-111	Warwick	10 - 10½
Int. Harv. of N. J., pref.	117¼	Cruc. Steel, com.	76⅛- 85
Int. Harv. Corp., com.	70 - 73¼	Cruc. Steel, pref.	114 -115¼
Int. Harv. Corp., pref.	107	Harb.-Walk. Refrac., com.	83½- 84
Lacka. Steel	77 - 81½	Harb.-Walk. Refrac., pref.	101
Nat. En. & Stm., com.	26¾- 29⅝	La Belle Iron, com.	50¼- 51
Nat. En. & Stm., pref.	96½- 97	La Belle Iron, pref.	124
N. Y. Air Brake	144¾-152	Can. Car & Fdy., com.	69 - 74
Pitts. Steel, pref.	93½- 95½	Can. Car & Fdy., pref.	90 - 91
Pressed Stl., com.	57¼- 59¾	Carbon Steel, com.	69
Pressed Stl., pref.	100 -102¾	Carbon Steel, 1st pref.	58
Ry. Stl., Spring, com.	40 - 44¼	Driggs-Seabury	143 -145
		Midvale Steel	66½- 71⅝

Dividends

The Niles-Bement-Pond Company, regular quarterly, 1½ per cent on the preferred stock, payable Feb. 15, and 1½ per cent on the common, payable March 20.

The Pratt & Whitney Company, regular quarterly, 1½ per cent on the preferred stock, payable Feb. 15.

The Maxwell Motor Company, regular quarterly, 1¾ per cent on the first preferred stock, payable April 1.

The Pittsburgh Steel Company, regular quarterly, 1¾ per cent on the preferred stock, payable March 1.

The Moline Plow Company, regular quarterly, 1¾ per cent on the first preferred stock, payable March 1.

The General Electric Company, regular quarterly, 2 per cent, payable April 15.

The Harbison-Walker Refractories Company, quarterly, 1 per cent on the common stock, payable March 1.

Chain Prices Again Advance

Effective Wednesday, Feb. 9, prices on chain, f.o.b. Pittsburgh, were again advanced, this time $10 per ton, and are now as follows, per 100 lb., on straight link, proof coil, self-colored or blacked: 3/16 in., $8.60; ¼ in., $6.05; 5/16 in., $5.05; ⅜ in., $4.50; 7/16 in., $4.35; ½ and 9/16 in., $4.20; 15/16 in., $3.90; 1 in., $3.80; 11/16, 1⅛ and 1¼ in., $3.90. Extras to be added to proof coil chain prices per 100 lb., twisted link coil, 3/16 to 7/16 in., inclusive, 25c.; bright coil chain, 25c.; B. B. quality, 3/16 and ¼ in., $1.25; 5/16 in. and larger, $1; B. B. B. quality, 3/16 and ¼ in., $1.75; 5/16 in. and larger, $1.50.

The International Trading Company, Kobe, Japan, desires to receive catalogs and prices on wire nails, chiefly 1½ and 2 in. long, steel sheets, shovels, axes, picks and hoes. Payments, it is stated, will be made in cash through New York bankers against shipping documents at the place of export.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2c. to 2.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 2.10c. to 2.75c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Rods.—Bessemer, open-hearth and chain rods, $50 to $52, nominally.

Wire Products.—Prices to jobbers, effective Feb. 14: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.15; galvanized, $2.85. Galvanized barb wire and staples, $3.15; painted, $2.45c. Wire nails, $2.30. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Woven wire fencing, 63½ per cent off list for carloads, 62½ off for 1000-rod lots, 61½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.20	$2.25	$2.30	$2.35	$2.50	$2.60	$2.70	$2.80
Galvanized	3.10	3.15	3.20	3.25	3.30	3.45	3.80	3.90

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Feb. 15, 1916, on iron and steel black and galvanized pipe, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	68	42½	⅛ and ¼	57	31
½	72	55½	⅜	58	32
¾ to 3	75	59½	½	62	42
			¾ to 1½	63	47
			2	64	46

Lap Weld

2	72	56½	1¼	45	31
2½ to 6	74	58½	1½	60	42
7 to 12	70	53½	2	61	44
13 and 14	60½	..	2½ to 4	63	47
15	58	..	4½ to 6	63	47
			7 to 12	61	45

Reamed and Drifted

1 to 3, butt	73	57½	1 to 1½, butt	63	45
2, lap	70	54½	2, butt	62	44
2½ to 6, lap	72	56½	1¼, lap	47	29
			1½, lap	58	40
			2, lap	59	42
			2½ to 4, lap	61	45

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	64	47½	⅜	56	39
½	69	56½	½	61	47
¾ to 1½	73	60½	¾ to 1½	65	49
2 to 3	74	61½	2 and 2½	65	49

Lap Weld, extra strong, plain ends

2	70	55½	1½	59	42
2½ to 4	72	57½	2	62	45
4½ to 6	71	56½	2½ to 4	64	48
7 to 8	66	49½	4½ to 6	63	47
9 to 12	61	44½	7 to 8	56	40
			9 to 12	51	35

Butt Weld, double extra strong, plain ends

½	60	47½	½	51	36
¾ to 1½	63	50½	¾ to 1½	54	39
2 to 2½	65	52½	2 and 2½	55	40

Lap Weld, double extra strong, plain ends

2	61	48½	2	52	36
2½ to 4	63	50½	2½ to 4	54	41
4½ to 6	62	49½	4½ to 6	52	39
7 to 8	56	39½	7 to 8	45	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.60 to 2.75
Nos. 9 to 10	2.65 to 2.80
Nos. 11 and 12	2.70 to 2.85
Nos. 13 and 14	2.75 to 2.90
Nos. 15 and 16	2.85 to 3.00

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.40
Nos. 22 and 24	2.45
Nos. 25 and 26	2.50
No. 27	2.55
No. 28	2.60
No. 29	2.65
No. 30	2.75

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.75 to 4.00
No. 12	3.85 to 4.10
Nos. 13 and 14	3.85 to 4.10
Nos. 15 and 16	3.95 to 4.20
Nos. 17 to 21	4.10 to 4.35
Nos. 22 and 24	4.30 to 4.55
Nos. 25 and 26	4.45 to 4.70
No. 27	4.60 to 4.85
No. 28	4.75 to 5.00
No. 29	4.90 to 5.15

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes, in effect from Jan. 14, 1916, and standard charcoal-iron tubes, effective from Jan. 20, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	43	1½ in.	38 to 39
1¾ and 2 in.	55	1¾ and 2 in.	42 to 43
2¼ in.	52	2¼ in.	39 to 40
2½ and 2¾ in.	58	2½ and 2¾ in.	46 to 47
3 and 3¼ in.	63	3 and 3¼ in.	50 to 51
3½ to 4½ in.	64	3½ to 4½ in.	52 to 53
5 and 6 in.	57	5 and 6 in.	46 to 47
7 to 13 in.	54		

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

Feb.	Lake	Copper Electrolytic	Tin, New York	Lead New York	Lead St. Louis	Spelter New York	Spelter St. Louis
9	26.75	26.62½	41.12½	6.25	6.15	19.50	19.25
10	26.87½	26.87½	41.12½	6.25	6.15	19.75	19.50
11	27.00	26.87½	41.30	6.25	6.15	19.75	19.50
12	27.12½	27.00	.....	6.25	6.15	19.75	19.50
14	27.25	27.12½	41.87½	6.25	6.15	19.75	19.50
15	27.37½	27.25	42.25	6.25	6.15	20.25	20.00

NEW YORK, Feb. 16, 1916.

Buying of copper has been heavy at steadily advancing prices, and the market appears to be on the verge of running away. Business in tin has been large and prices are higher. Lead is up $3 per ton and the strong export demand continues. Spelter is active and higher. Spot antimony is difficult to obtain and quotations are higher though nominal.

New York

Copper.—So far as quantities of any considerable size are concerned the actual market continues to be in deliveries to be made in the second quarter and beyond. Quotations have continued to advance and the trade is asking where the present movement will lead to. Spot and nearby copper is scarce and commands fancy premiums. Fairly prompt metal has sold this week at 29.62½c., full terms, and there have been other sales at 29.50c. The changes in the market are so frequent that the trade is uneasy and would like to see a halt called, as it has enough orders booked to keep it busy for some time and does not like to go too far into the future. Good sales have been made every day, mainly of electrolytic. Buyers are seeking the sellers to such an extent that the latter need make no effort to get business. For deliveries to be made from June to the end of the year 27c. is quoted, while quotations for the period from February to June range from 29.50c. for nearby to 27c. for June. March and April electrolytic has sold at 28.50c. and May at 28c. Many of the buyers do not seem to care what they pay. They are making war materials and base their estimates on the price of copper which they first ascertain. The output in brass and copper goods of the largest manufacturing producers is reported to be about 2,000,000 lb. each 24 hr. Rolling mills continue to experience difficulty in getting special shapes. The exports of the month, including yesterday, total 7595 tons, but this takes no account of the vast amount which is going abroad in manufactured form.

Tin.—The past week has seen great activity. Last Thursday about 500 tons, mostly for future delivery, was dealt in, while on Friday a still larger business was done, estimates placing the aggregate of sales at 800 tons. On Monday about 600 tons was taken, and quotations gained strength rapidly. Yesterday the market was a little quieter, about 250 tons changing hands. The quotation for spot tin yesterday was 42.25c. The total amount afloat yesterday was 5043 tons, and there had arrived in the month 3542 tons.

Spelter.—There has been active buying here, and the market has been strengthened also by sharp advances at London where the quotation for prompt went up yesterday £6 per ton, to £99, which is equal to over 21c. Nearby deliveries are scarce in this market and there appear to be more buyers than sellers, a condition which makes the market appear to be more active than it really is. March spelter was quoted this week at 20c., New York, and second quarter at 18c. The exports this month, including those of yesterday, total 1402 tons.

Lead.—Late on Feb. 9 the leading producer announced the expected advance in lead and made the new price 6.25c., New York, and 6.15c., St. Louis, thus putting the price up $3 per ton. The principal feature of the market is the large export demand; Russia in particular has inquired for large lots, and a heavy foreign business has been done. Prices have hardened at London, subsequently becoming firmer here. The trade is at a loss to know why domestic consumers are buying so sparingly, in view of the fact that there is little hope for lower prices while the foreign demand continues so heavy. It is admitted that 6.25c. is an abnormal price for lead, but the market is very strong at this figure and a further advance would not be surprising. The exports this month, including yesterday, total 3859 tons.

Antimony.—Demand has been good for early arrivals which are quoted at 43c. to 44c., while spot ranges from 43.50c. to 45c. In the past week arrangements have been made with the British Government whereby jobbers may draw on certain stocks which are to be carried in public warehouses in the name of the British consul. Withdrawals can be made only with the consent of that official and on the presentation of a formal guarantee from the consumer stipulating that pains will be taken to keep antimony and any of the products into which it enters from England's enemies.

Aluminum.—The market has gained strength and quotations have advanced. No. 1 virgin aluminum, 98 to 99 per cent pure, is now quoted at 58c. to 60c. per lb.

Old Metals.—No indications are yet seen of a check to advancing prices. Dealers' selling prices are about as follows:

	Cents per lb.
Copper, heavy and crucible	25.00 to 26.00
Copper, heavy and wire	24.00 to 25.00
Copper, light and bottoms	20.00 to 21.00
Brass, heavy	15.00 to 15.50
Brass, light	12.50 to 13.00
Heavy machine composition	18.00 to 19.00
No. 1 yellow rod brass turnings	16.00 to 16.50
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	5.75
Lead, tea	5.25
Zinc	14.00 to 15.00

Chicago

FEB. 14.—With record prices for spot copper, and smelters declining to quote for earlier than April shipment, the current market presents sensational features. The sharp advance in lead is also a matter of concern to many users. We quote: Casting copper, 27.50c.; Lake copper, 28.50c.; tin, carloads, 42.50c.; and small lots, 44.50c.; lead, 6.20c.; spelter, 20c.; sheet zinc, 24c.; Cookson's antimony, 50c.; other grades, 46c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 20c.; copper bottoms, 19c.; copper clips, 20c.; red brass, 18c.; yellow brass, 16c.; lead pipe, 6c.; zinc, 13.75c.; pewter, No. 1, 26c.; tinfoil, 34c.; block tin pipe, 38c.

St. Louis

FEB. 14.—All metals moved steadily upward during the week and corresponding advances in old metals were also made. The closing quotations to-day were as follows: Tin, 45c.; Lake copper, 28.50c.; electrolytic copper, 28.25c.; antimony, Asiatic, 46c.; lead, 6.40c.; spelter, 21c. In the Joplin ore market the price of zinc blende went as high as $125 per ton. On second grade ores the range was from $95 to $110. Calamine ran as high as $87.50, the highest price by $5 ever paid. Lead ore jumped to $86. The average value of the production sold in the district for the week was: Zinc blende, $105; calamine, $83; lead, $85. Miscellaneous scrap metals are quoted as follows: Light brass, 10c.; heavy yellow brass, 13c.; heavy red brass and light copper, 15c.; heavy copper and copper wire, 17c. to 19c.; zinc, 10c.; lead, 5c.; tea lead, 4c.; pewter, 24c.; tinfoil, 33c.

The Tacoma Smelting Company, Tacoma, Wash., a Guggenheim interest, has been advised by its Eastern connections that a new refinery will be erected in Tacoma at a cost of $350,000. The new plant will have a capacity of 2000 tons monthly, and construction will begin in the near future. With the proposed plant, the new plant now being completed and the old plant, the company will have the largest refining capacity in the West, amounting to more than 8000 tons per month.

The chrome ore output of New Caledonia for 1914 is placed at 75,000 tons or 35 per cent more than in 1913. The value of the exports of chrome ore in 1914 were £108,000.

OBITUARY

LOUIS DUNCAN, of the firm of Duncan, Young & Co., 50 Church Street, New York, died suddenly Feb. 13 at his home at Pelham Manor, N. Y., aged 53 years. He was born in Washington, D. C., was appointed from Kentucky to the United States Naval Academy by President Grant in 1876, and was graduated with distinction in 1880. He was an electrical engineer of prominence, having specialized in traction work. He was consulting engineer in the electrification of the first subway system of New York City. He was also officially connected with other important street railroad electrification work. He was the author of numerous articles on electrical subjects and was a member of various clubs and technical societies. He leaves his widow, one son and three daughters.

T. I. STEPHENSON, president Knoxville Iron Company and Cross Mountain Coal Company, Knoxville, Tenn., died Jan. 18 at his home in that city, aged 53 years. He was born at Lenoir City, Tenn., and later moved to Knoxville, and was educated there. He began work with the Knoxville Iron Company in 1880, and in 1891 was made secretary. He was elected vice-president and general manager in 1895, and president and general manager in 1910. He was elected president of the Cross Mountain Coal Company in 1914. He was a member of several organizations. He leaves his widow and two children.

GEORGE A. MACBETH, president MacBeth-Evans Glass Company and one of the pioneers in the industry, died suddenly Feb. 11 at his home in Pittsburgh, aged 70 years. He was born in Urbana, Ohio, and started his business career in a drugstore in 1868. Four years later he entered the glass business under the name of George A. MacBeth & Co., which became the MacBeth-Evans Company in 1900. He was the first American manufacturer to exhibit optical glass at the World's Columbian Exposition and the first to manufacture lighthouse lenses in this country.

WILLIAM JASPER NICOLLS, a prominent civil and mining engineer, as well as an author on technical subjects and of fiction, died suddenly in the Art Club, Philadelphia, Feb. 14, aged 63 years. He was born in Camden, N. J., and in 1873 became assistant engineer of the Philadelphia & Reading Railroad. In 1875 he was appointed chief engineer of the Pennsylvania Steel Company and in 1880 became chief engineer of the Long Island Railroad. Since 1882 he had been in business for himself as consulting engineer.

WALTER FRANK CARR, for 13 years chief engineer of the Falk Company, Milwaukee, died suddenly of heart disease on Feb. 2 at his home in Seattle, aged 55 years. He went to Seattle in 1912 to establish himself as consulting engineer and manufacturers' agent. He was educated at the Massachusetts Institute of Technology and was a member of the American Society of Civil Engineers and the Engineers Club of Seattle.

WILLIAM C. STEWART, Cleveland, Ohio, president and general manager of the American Enameling & Stamping Company, Bellaire and Massillon, Ohio, died Feb. 10 in a hospital in North Wheeling from injuries received in a collision between a trolley car and train while making a trip from Wheeling to Bellaire. He was 64 years old. He leaves his widow and five children.

FREDERICK BUCHERER, Elizabeth, N. J., one of the pioneer salesmen in the electrical field, died Feb. 7 after a short illness. He had been a salesman for the Diehl Mfg. Company for over 22 years and thus became well known throughout the New York electrical jobbing and contracting trades.

CHARLES H. L'HOMMEDIEU, traveling representative of the American Steel & Iron Works, Cincinnati, Ohio, died in Louisville, Ky., where he was stricken with paralysis while visiting the plant of the Louisville Bridge & Iron Company. He was 70 years of age.

P. J. CUNEEN, for the past 12 years manager of the Lassig plant of the American Bridge Company, at Chicago, died Feb. 13 at his home in that city.

New England Foundrymen

By-Product Coke Furnishes Topic for Lively Discussion at February Meeting

Since the freight troubles began in New England the subject of coke supply and prices has been particularly interesting to the foundries of that section. At the monthly meeting of the New England Foundrymen's Association, held at the Exchange Club, Boston, Mass., Feb. 9, the principal speaker was W. J. Lavelle, New England Coal & Coke Company, who made an able presentation of the merits and field of application of "By-Product Coke." After briefly recounting the history of coke making in the United States, the various ovens and coking processes and the handling of coke for delivery to the cupola, the speaker entered into a discussion of the comparable values of by-product and beehive oven cokes and made some observations on cupola practice. In closing, he described the plant of the New England Coal & Coke Company and gave a résumé of its experiences and experiments in the manufacture of by-product coke and sketched briefly the growth of consumption of such coke in New England foundries.

T. F. Brown, Watertown Arsenal, who was the first speaker in the discussion following Mr. Lavelle's address, gave some details of cupola practice at the arsenal, where both kinds of coke are used. F. T. Sunbury, Putnam Machine Company, Fitchburg, Mass., gave some concise facts regarding the use of by-product coke and emphasized the advantages which he had found in its use. Secretary Fred F. Stockwell of the association read a paper contributed by W. R. Johnson, American Brake Shoe & Foundry Company, Norwood, Mass., in which the writer described in detail the changes made in cupola practice at the Norwood plant during its first trials of by-product coke and how success was finally achieved.

Keen interest was displayed by the members, and many searching questions were asked of the different speakers. It was evident that each kind of coke had its ardent advocates in the audience, and the frank manner in which the different points were discussed made the meeting an unusually helpful one. The new president of the association, Stephen E. French, Athol Machine Company, Athol, Mass., presided.

At a recent meeting of the directors of the Knoxville Iron Company, Knoxville, Tenn., Capt. H. S. Chamberlain was re-elected vice-president; W. P. Davis was elected general manager to fill the vacancy caused by the death of T. I. Stephenson, and O. A. Brown was re-elected secretary and treasurer. The directors of the Cross Mountain Coal Company re-elected Capt. H. S. Chamberlain vice-president; elected W. P. Davis, general manager, and re-elected E. D. Attix secretary and treasurer.

The No. 2 blast furnace of the Worth Brothers Company, Coatesville, Pa., was blown in Feb. 10. It has been idle since last July. No. 1 furnace has been in operation since No. 2 was blown out. This is the first time since the furnaces were built that they have both been in operation at one time. They have a daily production of 450 tons each. Work on No. 3 furnace, which will have a daily capacity of 500 tons, is in progress and it will be rushed to completion.

The Canadian Steel Foundries, Ltd., Welland, Ont., Canada, announces that $100,000 will be spent at once on new machinery and equipment. One and possibly two 35-ton open-hearth furnaces will be added, and the rolling mills will be started again. The output of the plant will be shell steel and car shapes.

The Matthew Addy Company, Cincinnati, Ohio, pig-iron merchant, has increased its capital stock from $100,000 to $150,000. The company recently embarked in the exportation of machine tools and other machinery.

PERSONAL

Charles E. Hildreth, vice-president and treasurer, Whitcomb-Blaisdell Machine Tool Company, Worcester, Mass., who is manager of the National Machine Tool Builders' Association, represented that organization at the fourth annual meeting of the Chamber of Commerce of the United States at Washington, Feb. 8-10.

William Pigott, vice-president Pacific Coast Steel Company, has been in New York for some days and is now on his way to Seattle, Wash., stopping at Youngstown and Chicago. It is understood that this company is considering the installation of a plate mill at its Seattle plant, while in a late issue mention was made of its engaging for a beam plant. It has bar rolling mills at South San Francisco and similar equipment at Seattle.

D. B. Meacham, of Rogers, Brown & Co., Cincinnati, is spending a portion of the winter in southern California.

H. O. Swoboda, Empire Building, Pittsburgh, Pa., has been retained by the Humphrey Company, Kalamazoo, Mich., manufacturer of water heaters, as its consulting engineer for the purpose of designing a line of electric heaters.

S. E. Elmore, formerly Central sales manager of the Bucyrus Company, South Milwaukee, Wis., has been made superintendent of the company's plant at Evansville, Ind. E. C. Hingston goes to Chicago as Central sales manager and G. H. Hutchinson will be Western sales manager, having his office at 806 Merchants National Bank Building, San Francisco. Mr. Hutchinson will cover California, Nevada, Utah and Arizona. L. T. Russell, as Northwestern sales manager, will continue his office at 608 Pittock Block, Portland, Ore., handling business in Washington, Oregon, Idaho and western Montana.

H. E. Zimmerman, formerly chief clerk in the order department of the Cambria Steel Company, Johnstown, Pa., has resigned to take charge of the order and shipping departments in the new open-hearth steel plant of Corrigan, McKinney & Co., Cleveland, Ohio.

A. H. Woodward, chairman of the board of directors of the Woodward Iron Company, has been elected chairman of the board of the reorganized Atlanta, Birmingham & Atlantic Railroad. This road has a branch line operating between the Woodward Iron Company's furnace properties and mines at Mulga, Ala.

Edward J. Muller, treasurer and general manager Fuchs & Lang Mfg. Company, paints, 119 West Fortieth Street, New York, has retired after 32 years of active participation in the conduct of the company. He is succeeded by Albert J. Ford.

The Engineers' Society of Milwaukee, Wis., will give a banquet on March 21, at which the guest of honor will be Dr. John A. Brashear, Pittsburgh, past-president American Society of Mechanical Engineers.

Frank A. Buckham, for many years treasurer and general manager Nason Mfg. Company, has become associated with the Walworth Mfg. Company, Boston, Mass., as manager of its New York branch, with offices at 19 Cliff Street.

Henry Bertram has been elected a director of the Niles-Bement-Pond Company, to succeed C. E. Burke.

The Donaldson Iron Company, Emaus, Pa., has re-elected John D. Ormrod president.

The Manufacturers' Association, Seattle, Wash., has elected H. H. Stuart, principal owner of the Pacific Coast Condensed Milk Company, president of the association. Mr. Stuart replaces Mr. Charles W. Loomis, resigned.

Oscar E. Thompson, consulting mechanical engineer, Phoenixville, Pa., has been appointed mechanical engineer in the division of hygiene and engineering, Department of Labor and Industry of Pennsylvania, to succeed Richard M. Pennock, recently appointed safety engineer to the State Insurance Board.

Mammillan Groten, member of the Imperial Russian Trade Commission, visited President Arthur King at the Middletown Car Works, Middletown, Pa., Feb. 9. While his company has booked a number of orders from foreign governments, President King denied published reports that Commissioner Groten's visit had anything to do with a Russian order.

A. M. Stewart has been appointed district representative at Chicago for the Matthew Addy Company, and R. E. Lundgren, formerly in the Chicago office of Hickman, Williams & Co., will be associated with the Matthew Addy Company in connection with pig-iron sales.

Arthur Simon, Cutler-Hammer Mfg. Company, Milwaukee, Wis., in an address before the Engineers' Society of Milwaukee, said that Japan has arranged to experiment with Cutler-Hammer lifting magnets to locate and raise submerged torpedoes. The statement was made to illustrate the wide application of electromagnets. The Japanese experiments are the first of the kind that have come to notice and will doubtless be watched with great interest because of the possible important factor the lifting magnet may become in warfare.

J. William Peterson, vice-president and chief engineer Richardson-Phenix Company, lubricating devices, Milwaukee, Wis., in an address before the Rotary Club of Milwaukee, said that proper lubrication increases the efficiency of power equipment from 20 to 25 per cent. Engines capable of generating 1000 hp., but found to be operating with only 70 per cent efficiency, have been brought up to 90 and 95 per cent efficiency by proper lubrication, effecting a saving of $6,000 annually. He cited an instance of an electrical plant producing 50,000 hp. with 14 generators, which uses 52,500 gal. of lubricating oil every hour. By the installation of good lubricating machinery, 15,000 gal. are used 80 times over in the course of a day.

G. W. Roosa, for several years connected with the lighting department of the Westinghouse Electric & Mfg. Company, became associated Feb. 1 with the Holophane Glass Company, Newark, Ohio, and will have charge of the sales of its products in New York, Ohio and western Pennsylvania.

Hugh B. Wick has been elected president of the Elyria Iron & Steel Company, Cleveland, Ohio, filling the vacancy caused by the recent death of his father, Henry Wick. Myron A. Wick has succeeded Hugh B. Wick in the office of vice-president, also retaining his former office as treasurer. J. L. Barnard retains his former position as secretary and assistant treasurer.

Automatic Sprinkler Consolidation

Powell Evans, president Merchant & Evans Company, Philadelphia, has been elected president of the Globe Automatic Sprinkler Company of Pennsylvania, manufacturer of automatic sprinklers, fabricated pipe and fittings. The latter company has greatly expanded its business, the specific steps being the recent purchase of the Globe Automatic Sprinkler Company of Ohio, the automatic sprinkler department of the Rundle-Spence Mfg. Company, Milwaukee, Wis., and the enlargement of the plant at Warwood, near Wheeling, W. Va., now nearing completion. The Merchant & Evans Company will transfer to the Globe all contracts for the Evans automatic sprinkler, together with all future inquiries for sprinkler installations.

The Merchant & Evans Company at present installs about one-third of all the sprinkler installations in the country. Its plant, located at 2019 to 2035 Washington Avenue, Philadelphia, occupies about 14 acres of floor space. A large part of the company's output consists of automobile clutches. It supplies more than 100 automobile manufacturers with clutches.

The Alabama Public Utilities Commission has allowed a rate of 40c. per ton to the Birmingham Belt and the Birmingham Southern railroads for conveying molten metal from blast furnaces to consuming plants. This will enable the foundries of the Birmingham district to secure molten metal and avoid remelting.

Pittsburgh and Nearby Districts

The annual meeting of holders of common stock of the Youngstown Sheet & Tube Company was held in Youngstown, Ohio, last week, at which directors were elected as follows: James A. Campbell, E. L. Ford, H. G. Dalton, C. D. Hime, J. G. Butler, Jr., H. H. Stambaugh, Robert Bentley, George E. Day, J. L. Severance, Hugh B. Wick and Richard Garlick. Hugh B. Wick was elected a director to succeed his father, the late Henry Wick. Officers were re-elected. James A. Campbell has been president of the company for 13 years. Reports presented showed that the payroll for 1915 was $6,603,677.68, as compared with $6,754,348.82 in 1914, this reflecting the depressed conditions existing in the steel trade in the first half of 1915. The output of pig iron in 1915 from the four blast furnaces was 711,507 tons, the average daily output of each being 529 tons. Shipments of finished and semi-finished material in 1915 were the largest in any one year in the history of the company. A bonus of about $300,000, representing 5 per cent of their earnings in 1915, will be distributed to employees in March.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., has received an order from the Phillips Sheet & Tin Plate Company, Weirton, W. Va., for the complete electrical equipment of the new mill now in process of erection, combining two 3000-kw. turbo alternators, one 1500-hp. constant speed alternating-current motor, one 2500-hp. adjustable speed motor and one 800-hp. adjustable speed motor. The speed adjustment of about 50 per cent from high speed is obtained on the 2500 and 800-hp. motors by means of direct current synchronous control, a novel scheme devised and advocated by Westinghouse engineers. Other large contracts taken include one from the Commonwealth-Edison Company, Chicago, for a 30,000-kw. turbo-generator, capable of carrying a momentary overload of 35,000 kw., and one from the Duquesne Light Company, Pittsburgh, for a 40,000-kw. cross compound turbo-generator, capable of carrying momentary overloads of 46,000 kw.

After being closed for about three years, the plant of the Kittanning Iron & Steel Mfg. Company, at Kittanning, Pa., is expected to start up next week, as necessary repairs are now being made. The plant makes muck bar, which is sold in the Pittsburgh district.

The Bronze Metal Company, Meadville, Pa., is making plans for an addition to its plant, to cost about $80,000. The company expects to place contracts for equipment in a short time.

The Pittsburgh Metals Company, Pittsburgh, has been granted a Delaware charter, with a capital of $50,000, to manufacture and deal in steel, iron, etc. The incorporators are F. R. Hansell of Philadelphia, George H. B. Martin and S. C. Seymour of Camden, N. J.

The Carnegie Steel Company has appropriated about $100,000 for the erection of an office building at its Ohio works, Youngstown, Ohio. The building will be three stories with basement and will be strictly fireproof and modern in every detail. It will have a granite block face. A large dining room will be a feature, for the use of officials and office employees.

The Pittsburgh Model Engine Company, Pittsburgh, has recently bought about 100 machine tools, and is in the market for considerable other equipment.

Lau & Hogan, structural and ornamental wire and iron work, Youngstown, Ohio, dissolved partnership Feb. 8, W. C. Hogan retiring and selling out his interest therein to A. W. Lau. The business will be conducted under the name of Lau Iron Works Company. All outstanding indebtedness against Lau & Hogan is assumed by Mr. Lau, and all bills receivable, etc., are payable to him.

The W. R. Miller Company, House Building, Pittsburgh, has been incorporated, and will take over the business of the Forter-Miller Engineering Company, contracting engineer and designer and builder of heating furnaces and gas producers, and now located in the Hartje Building, Pittsburgh. Nearly all employees of the old company will be with the new one.

The House of Representatives at Washington has passed a bill granting permission to the Republic Iron & Steel Company to construct a steel bridge across the Mahoning River, to connect several of its plants in the Youngstown district.

The Carnegie Steel Company, Pittsburgh, is asking for preliminary bids on equipment to be installed in its new plant at McDonald, near Youngstown, Ohio. The plant will contain ten bar and hoop mills, and the company is in the market for twenty bar-mill cranes among the equipment desired.

The Knox Pressed & Welded Steel Company, Pittsburgh, has increased its capital stock from $200,000 to $400,000.

The Goodman Engine & Machine Company, Pittsburgh, has been granted a re-charter under the laws of Pennsylvania, with a capital stock of $45,000. James Hogan is treasurer.

Spang & Co., Inc., Butler, Pa., manufacturer of machinery and oil well supplies, has increased its capital stock from $200,000 to $500,000, and its debt limit to $400,000.

Nashville Hardware Consolidation

Keith, Simmons & Co., hardware and mill supplies, Nashville, Tenn., have purchased the business, good will, equipment, etc., of J. H. Fall & Co., of the same city. J. H. Fall has been the sole proprietor of that house for many years, but he recently acquired partnership in the banking firm of Tucker, Anthony & Co., New York City, where he has been living for some time, so he concluded to close out his Nashville business. It was probably the oldest hardware firm in the State, the business having been established in the early part of the nineteenth century, or about 1820, and was formerly conducted by Mr. Fall's father. It has enjoyed a very profitable business through all of this period. The firm of Keith, Simmons & Co. began business in 1899. Both Mr. Keith and Mr. Simmons had been partners in the firm of J. H. Fall & Co. up to that time, when they sold out to J. H. Fall & Co. and started the present firm. The wholesale business will be done from the building occupied by J. H. Fall & Co., which is conveniently located for carrying on that character of trade. The purchase will make Keith, Simmons & Co. probably one of the largest hardware jobbing concerns in Tennessee, expecting to do considerably over $1,000,000 per annum.

A Tin-Plate Mill for Norway

A Norwegian tin-plate mill, with an annual production of at least 30,000 tons, is to be built by interests connected with the fish canners of Stavanger, Norway, who have been trying to become independent of foreign countries for their supply, according to Consul-General L. H. Dennison of Christiania, Norway. More than 30,000 tons of tin plate is used each year in the Stavanger district alone. The new enterprise will cost more than $1,000,000 and employ 400 to 500 men, but will not be started until the war is over.

German Embargo on Steel Exports

The German Government has placed an embargo on the export of structural steel, steel shapes and bar iron, according to the weekly report, issued Jan. 15, 1916, by American Association of Commerce and Trade in Berlin. An embargo on the export of machines and locomotives has been in effect for some time.

The Bon Air Coal & Iron Company, Nashville, Tenn., expects to blow in its Mannie furnace at Allen's Creek, Tenn., about April 1. The furnace meantime is being thoroughly overhauled and relined. The ore-washing plant is being repaired and the furnace railroad tracks, mine railroad tracks, steam shovels and all equipment are being put in condition for operation.

Machinery Markets and News of the Works

DEMAND SOMEWHAT EASIER

Markets Canvassed for Standard Tools

Some Tool Builders Hopelessly Behind on Commitments—Export Trade Lags in Cincinnati —New Ship Yards Under Construction

That the domestic demand is somewhat less active is indicated in several cities, but it is not to be wondered at when the question of deliveries is considered. In New York there have been some unpleasant reminders that some tool builders are hopelessly behind in deliveries, one or two having undertaken more orders than they can execute.

Buyers in Chicago are canvassing the market to get the best possible deliveries, and it is noted there that standard tools are preferred in many cases where machines which owe their existence to the war can be had earlier. Second-hand machinery is quieter in Chicago, partly because of its scarcity. Good-sized purchases have been made by the Moline Plow Company and Armour & Co. Prices of milling and planning machines, also tool accessories, such as chucks, continue to advance.

The Mitchell Machinery Company has leased a plant of the Great Northern Iron Works, Canton, Ill., where it will manufacture road machinery. The Illinois Central Railroad has awarded a contract which will double the capacity of its machine shop at Waterloo, Iowa.

The expected renewal of export contracts has not developed to any great extent in Cincinnati, although such business is by no means at an end. Railroad buying is conspicuous only by its absence, while another adverse feature is new labor trouble in local machine shops. An early settlement is looked for.

The Globe Automatic Sprinkler Company, Cincinnati, announces its intention of moving its plant to Wheeling, W. Va. It was recently consolidated with other companies in the same line, and its capital stock was increased from $1,000,000 to $2,000,000.

Business is well scattered in Cleveland, with an especially good demand from automobile and rubber manufacturers. The demand from American and Cuban sugar makers is heavy.

The following companies in Michigan will erect buildings or additions: Bour-Davis Motor Car Company, Detroit, first unit of plant to manufacture 2000 automobiles per year; Detroit United Railway Company, Detroit, car repair shop; Grand Rapid Brass Company, Grand Rapids, Mich., branch plant, including foundry and machine shop; Michigan Foundry Company, grey iron foundry at Holland.

Milwaukee reports that the Kearney & Trecker Company, maker of milling machines, has begun the erection of a large addition to its works, also that the Kempsmith Mfg. Company has increased its capital $50,000 to provide for an increase in facilities. The Charles H. Besly Company, Beloit, Wis., is adding two stores to a recently completed shop.

The Wagner Electric Company, St. Louis, is in the market for equipment to be installed in a three-story addition, 90 x 125 ft. The Farm Engineering Company, Sand Springs, Okla., through its purchasing department at Oshkosh, Wis., is in the market for a number of tools.

Countries other than the United States are extending their shipbuilding facilities. The Canadian Department of Trade and Commerce has received from the Government of Australia plans and specifications for dockyard equipment for delivery to Cockatoo Island, Sydney, New South Wales. The Dry Dock & Engineering Company, North Vancouver, B. C., will build a shipbuilding plant, and has awarded to the Pacific Dredging Company the contract for buildings.

The J. D. Barnes Company, San Francisco, Cal., will erect a shipbuilding plant at Alameda, Cal., to cost about $500,000.

New York

NEW YORK, Feb. 16, 1916.

It is being unpleasantly impressed on dealers in machine tools that some of the builders are hopelessly behind in their deliveries, in fact one or two makers have asked that contracts with buyers be cancelled, if it can be done, for they realize that they cannot make good on their commitments. Not only have recent strikes held them back, but they have found it difficult for other reasons to maintain maximum working pressure, as they had hoped to do. In one or two instances the temptation of special work at high prices was too great to be resisted and effort was divided with bad results for the output of machine tools. It should be said that there are few of these among the well-known manufacturers. One company temporarily manufacturing lathes virtually repudiated an agreement to supply a considerable number of machines, but was subsequently willing to do so at a higher price.

Various rumors are afloat in the machine tool trade as to the formation of new enterprises whose principal function will be to sell abroad. One of these proposes to manufacture, as well as to sell abroad. It is not known what definite steps have been taken or what interests are behind the propositions, but it is known that some tool builders and selling interests have been sounded as to their willingness to share in the project. It is assumed that interests outside the machine-tool industry have been impressed by the extent of the war business done, and by opportunities expected to come after the war, and would organize a big manufacturing and selling organization.

With the makers of standard machines sold up until autumn it is natural that sales should become more difficult to consummate, but nevertheless there is a steady demand for one or a few machines needed by domestic manufacturers, while occasionally a good-sized lot is purchased, as in the case of Brewster & Co., automobile maker, of this city, who placed an order last week.

With the export trade the great difficulty continues to be the scarcity of ocean freight space.

Ed. Maurer, Inc., export commission agent, 80 Maiden Lane, New York, is making inquiry for a large number of machine tools, most of which are specified. The list includes rifling machines, boring mills, engine lathes, turret lathes, and milling, drilling and grinding machines. They are intended for Italy.

The International Arms & Fuse Company, Bloomfield, N. J., has secured an order valued at approximately $16,000,000 for time and contact fuses. The order is similar to one obtained by the company from the Canadian Shell Committee in 1915. The new contract was obtained through J. P. Morgan & Co.

Milling and grinding machines are in heavy demand, the former for the reason that small arms manufacturers use more milling machines than any other kind, one estimate putting the quantity used as 80 per cent.

The report that the Eastern Tool & Mfg. Company, 74 Richmond Street, Newark, N. J., is about to take bids for the construction of a tool and manufacturing plant to cost $75,000, is without foundation. Plans have been drawn for a building to cost about $15,000 complete; but owing to the excessive price of materials no time has been set for the erection of the plant. Marshall N. Shoemaker, 521 Union Building, Newark, N. J., is the consulting engineer.

D. B. Dunham & Son, Inc., builder and repairer of automobile coach work, Central Avenue and Fourth Street, Newark, N. J., has temporarily leased property at 359 Halsey Street, where it will continue its business pending alterations to its former plant.

The Martin Dennis Company, 859 Summer Avenue, Newark, N. J., will erect a plant on the Newark meadows. It is reported that manufacturing, office and sales buildings and a powerhouse, to cost altogether about $75,000, are included.

The Jacob Dold Packing Company, Buffalo, will erect and equip an eight-story and basement cold-storage warehouse, 80 x 116 ft., and a three-story and basement oil-storage house, 42 x 71 ft., at its meat-packing plant at William Street, Fillmore Avenue and the New York Central Railroad.

Watervliet, N. Y., has plans in preparation for improvements to the municipal electric light plant, estimated to cost $20,000.

The Ferguson Steel & Iron Company, Buffalo, N. Y., has increased its capital stock from $150,000 to $300,000, of which $112,500 is in cash and $37,500 in stock dividends. This increase was necessary in order to take care of its rapidly increasing business and to provide for improvements in building and equipment. J. E. Ferguson is president.

The Alling Rubber Company, 447 Broadway, Albany, N. Y., has increased its capital stock from $75,000 to $150,000 to provide for extending its manufacture of sporting goods, automobile supplies and rubber goods in general. N. E. Alling is president; S. N. Blakeslee, vice-president, and W. C. Minor, secretary and treasurer.

It is reported that plans are being drawn by Starrett & Van Vleck, 8 West Fortieth Street, New York, for a four-story powerhouse to be erected on property, 107 x 116 ft., on Burling Slip, between Pearl and Water streets, at an estimated cost of $500,000. The height of the building, it is stated, will be equivalent to an eleven-story loft building. The New York Steam Company, steam service contractor, 140 Cedar Street, New York, while not financially interested in the erection of the plant, is considering the purchase of steam from its owners after completion.

The Stephen Jerry Company, 436 Manhattan Avenue, Brooklyn, N. Y., has taken out permit for the construction of a two-story brick cooperage shop, 50 x 100 ft., to be erected at Parker Street and Vandervoort Avenue, Brooklyn, at an estimated cost of $5,000. Harry Dorf, 614 Kosciusko Street, is the architect.

The Howe Rubber Company, New Brunswick, N. J., advises that on account of the protracted delay of three or four months before it could rebuild its tube plant, which was destroyed by fire at a reported loss of $150,000, it has decided to put up a concrete addition to its new tire department and move its tube business into that building. It plans to start operations in the new building about March 1. John Tenney, Jr., is president.

The William Steele & Sons Company, 1600 Arch Street, Philadelphia, Pa., has been awarded contract for the erection of the John Wanamaker Garage, which will be erected at Fourteenth Street and Broadway, New York. It will be 121 x 176 ft., seven stories and basement, of reinforced concrete. Specifications include six freight elevators.

The Westinghouse Lamp Company, 1261 Broadway, New York, manufacturer of incandescent lamps, has filed plans for the erection of a one-story addition to its plant in the Watsessing district, Bloomfield, N. J. It will be 75 x 100 ft., of reinforced concrete, and will cost about $12,000. Early in the spring the company expects to erect a large building in Bloomfield on its Arlington Avenue property.

The Peerless Tube Company, Broadway and Murray Street, New York, manufacturer of collapsible tubes, has awarded contract to Salmond Brothers, Arlington, N. J., for the construction of an additional factory alongside its present plant on Locust Avenue, Bloomfield, N. J. The company is working now both day and night shifts, and plans to have its new plant complete about March 1. George H. Neidlinger is president.

Plans are being completed for the establishment of a canning plant at Amityville, N. Y., to be a branch of the Brown Snapper Canning Company, Springfield, Ill. Edward E. Kochkeller, Amityville, is a stockholder in the project.

The board of village trustees, North Collins, N. Y., will receive bids until Feb. 23 for the construction of a waterworks, from plans of the J. F. Witmer Company, Dun Building, Buffalo, N. Y.

Philadelphia

PHILADELPHIA, PA., Feb. 14, 1916.

A factory building at 3233 to 3249 Woodland Avenue, owned by the Croft & Allen Company, has been leased by the Baldwin Locomotive Works. It is a five-story and basement building, containing about 100,000 sq. ft. of floor space, and it is reported will be used for storage purposes. The Baldwin Locomotive Works has awarded contract to S. W. Marks, Cleveland, Ohio, for an eight-story extension, 100 x 400 ft., of brick and reinforced concrete, to be added to its erecting shop at Eighteenth and Hamilton streets at a cost of about $500,000.

The Nagle Steel Company has been formed by L. F. Nagle to operate the plant which he has leased from the Glasgow Iron Company at Pottstown, Pa. The company expects to renovate and repair it. It will install the latest type of plate straightening rolls, tables, guillotine shears, traveling cranes, etc., and will put the mill in operation at the earliest practicable moment. Its product will be sheared steel plates and sheets from No. 10 B.W.G. to 1½-in. thick.

Francis L. Freas, manufacturer of hydrometers and thermometers, Conshohocken, Pa., has awarded contract for the erection of a new factory to be erected at Ninth Avenue and Hallowell Street.

Levering Brothers, 208 Hughes Avenue, Baltimore, Md., have awarded contract to William H. Hoffman for the construction of an addition, 25 x 100 ft., to their foundry and machine shop at Wheatfield Street and the Maryland & Pennsylvania Railroad, York, Pa. Construction work is in progress. Both this branch and its other plant at Hanover, Pa., are working at capacity in the manufacture of machinery castings.

Gehret Brothers, Bridgeport, Pa., have purchased several acres of land adjoining their plant from the Philadelphia & Reading Railroad, and plan to erect a large structural shop addition.

The Fleetwood Metal Body Company, manufacturer of automobile bodies, Fleetwood, Pa., has increased its capital stock from $25,000 to $115,000, and plans to increase its business in proportion. H. C. Urich is president.

The William Steele & Sons Company, 1600 Arch Street, Philadelphia, has been awarded contract for the construction of a garage to be erected in Philadelphia for John Wanamaker. It will be of reinforced concrete, 140 x 241 ft., four stories and basement, with a one-story wing, 110 x 227 ft.

The Victor Talking Machine Company, Camden, N. J., will erect a record-pressing building, six stories, 91 x 283 ft., which when completed, it is estimated, will double its output.

The Philadelphia Coppersmithing Company, 322 North Front Street, Philadelphia, has been granted a permit for alterations to its machine shop to cost about $6,000.

H. B. Henderson, Kittaning, Pa., is inspecting the penitentiaries in Pennsylvania for the State Prison Labor Commission with a view to equipping workshops in the two penitentiaries and the Huntingdon Reformatory. The appropriation for equipment is $75,000.

It is stated that the capacity of the Lansdale Electric Company, Lansdale, Pa., will be doubled.

The Victor Box Company, Quakertown, Pa., has completed its additional plant made necessary by the receipt of an order for ammunition boxes, and will give employment to a large additional force.

Baltimore

BALTIMORE, MD., Feb. 14, 1916.

A 32-acre tract at Canton, Md., has been purchased by the Baltimore Sheet & Tin Plate Company as the site for the new plant. J. M. Jones, Massillon, Ohio, was in Baltimore recently and closed the deal. It is planned to begin preparing for the construction of the plant this week. It is said there will be twelve hot mills.

It is understood that the Baltimore Drydock & Shipbuilding Company, Baltimore, of which Holden A. Evans is general manager, is considering making extensive improvements. No official announcement has been made.

The West Construction Company, Knickerbocker Building, Baltimore, has the contract for the erection of an addition, one-story, 62 x 225 ft., to the plant of the Baltimore Tube Company, Wicomico and Ostend streets.

Frederick, Md., is considering the erection of a new electric light plant.

Automobile repair equipment will be installed by the Acme Garage, Martinsville, Va. Prices on the equipment are being sought.

New England

BOSTON, MASS., Feb. 14, 1916.

The freight embargo on the lines of the New York, New Haven & Hartford Railroad was removed Feb. 12, except on shipments via Beacon, N. Y. In notifying shippers and business organizations, general manager C. L. Bardo placed emphasis on the necessity of keeping up the close co-operation between the railroad and the consignees, which had been one of the prime factors in relieving the situation.

The Taylor & Fenn Company, Hartford, Conn., has voted to increase its capital stock from $100,000 to $200,000, presenting the additional stock to the present shareholders as a bonus. The present board of directors was re-elected.

The Fess Rotary Oil Burning & Liquid Fuel Company, Boston, Mass., has bought the Wilcox factory at Athol, Mass., and will equip it for manufacturing purposes. At a meeting Feb. 12, R. N. Nichols was elected president; William McTarnahan, vice-president; and Henri C. Fay, Athol, secretary and treasurer.

The plant of the Franklin Machine Company, Providence, R. I., has changed hands and about $50,000 will be spent for new equipment which will enable the new owners to double the working force. E. G. Durfee has retired as president and has been succeeded by E. B. Hough. Some of the new owners have been for a long time associated with the American-British Mfg. Company. The company operates a foundry and manufactures special machinery, shafting and hangers.

The Peck, Stow & Wilcox Company, Southington, Conn., is building a new pickling plant.

The Bullard Machine Tool Company, Bridgeport, Conn., has announced an increase of pay of 10 per cent to all its employees.

The directors of the Trumbull Electric Company, Plainville, Conn., have submitted to the stockholders a proposal to increase the capital stock of $600,000, by issuing preferred stock to the amount of $300,000. Of this, $200,000 would be used to retire stock issued for a limited period and the balance for plant extension.

The Witt Oil Burning Equipment Company, Providence, R. I., has been incorporated with capital of $50,000 by William H. Hamlyn and others.

The American Emery Wheel Works, Providence, R. I., is building an addition, 40 x 70 ft., one story.

The Clinton Wire Cloth Company, Clinton, Mass., is erecting a new perforating plant. The main building is one story, 59 x 218 ft., and will be connected with a storage building and a coke house, with operating rooms on either side. A small blacksmith shop and a grinding room are also to be built. The present coke house will be remodeled into a boiler house. Charles T. Main, Boston, Mass., is the architect and engineer.

Detroit

DETROIT, MICH., Feb. 14, 1916.

The Bour-Davis Motor Car Company, Detroit, has been incorporated by C. J. Bour, Chicago; A. A. Gloetsner, and W. J. Brown, Detroit, and others, and has established temporary offices at 802 Fisher Arcade. It has purchased a three-acre site for a plant and will begin the erection of the first unit at once. An output of 2000 cars is planned for the first year.

The Esco Mfg. Company, Detroit, has been incorporated with a capital stock of $100,000 to manufacture automobile locks. The incorporators are E. R. Schreiter, Jr.; E. M. Clasen and F. E. Humphrey.

The Michigan Box Company, Detroit, has been incorporated with $60,000 capital stock to manufacture boxes and other companies. The incorporators are Herman Paepcke, Paul E. Duzurski and William C. Gilbert.

The Detroit United Railway, Detroit, has had plans prepared for the construction of a wood-working and car repair shop, 225 x 235 ft., one and two stories.

The Liberty Motor Car Company, Detroit, has been incorporated with $400,000 capital stock to manufacture automobiles, and arrangements for a factory are being perfected. Among the stockholders are Percy Owen, H. M. Wirth and R. E. Cole.

The Grand Rapids Brass Company, Grand Rapids, Mich., is erecting a branch plant at Belding, Mich., which will include a machine shop, foundry, plating room and other departments.

The Consumers Power Company, Jackson, Mich., will erect a power plant, 25 x 35 ft., at Grand Ledge, Mich.

The American Humidifier & Ventilator Company, Holland, Mich., has been incorporated with $50,000 capital stock to manufacture ventilating apparatus. The incorporators include Christian Becker and Frank Kleinheksel.

The Linderman Mfg. Company, Muskegon, Mich., manufacturer of metal products, has begun the construction of a second addition to its plant. Details of construction and equipment are not available.

The Standard Building & Fuel Company, Grand Rapids, Mich., will erect a washing and screening plant, 40 x 40 ft., to cost $20,000.

The Michigan Foundry Company, Holland, Mich., has been organized with a capital of $50,000 and will build a gray iron foundry, 100 x 105 ft. George E. Kollen is president.

Chicago

CHICAGO, ILL., Feb. 14, 1916.

The placing of a number of very desirable orders for machine tools by manufacturers in the immediately surrounding territory featured the local market of the past ten days. Among the more important of these purchases was a list of tools taken by the Moline Plow Company, totaling $25,000. Armour & Co. bought a number of machines also, while other orders covered equipment almost entirely for use in the manufacture of industrial products. For the most part the orders were widely distributed, where the business was placed, being dependent almost entirely upon the deliveries quoted. While buyers of machinery are canvassing the market most thoroughly in order to secure the best possible deliveries, a number of instances have brought out a preference for standard lathes, milling machines and similar tools, as against recent "war tools," even though deliveries of the former are of necessity much more tardy. The general experience points to a somewhat decreased activity in second-hand machinery. It is presumed that this is due in part to the congestion which has tied up shipping and in part to the scarcity of used equipment available for meeting demand. The disposal of the equipment in the Stickney plant at St. Paul by Harris Brothers, Chicago, is making available a large number of excellent tools, and the trade is actively bidding them in. Prices for new tools continue to advance, recent increases being noted for milling machines, planers and tool accessories, including chucks.

The Dryden Rubber Company has bought property adjoining its present plant at Twelfth Street and Kildare Avenue and will erect an automobile tire and inner tube factory in the spring.

The Koshovel Stoking Machine Company, Chicago, has been incorporated by A. C. Fordham, 7 South Dearborn Street; E. L. Kreamer, and D. L. Kilian.

Fire in the foundry of Brown & Hinkins Company, Thirty-fourth and Butler streets, Chicago, did about $2,000 worth of damage.

George S. Carrington, 2338 Van Buren Street, Chicago, is about to erect a two-story factory, 60 x 115 ft., at a cost of $25,000.

G. R. Barker, Chicago, will erect a one-story factory, 50 x 128 ft., at 7956 South Chicago Avenue, at a cost of $5,000.

The Mitchell Machinery Company has leased the plant of the Great Northern Iron Works at Canton, Ill., where it will manufacture road-makinig machinery. Melvin Mitchell, Peoria, Ill., is president.

The Krey Packing Company, St. Paul, Minn., has had plans prepared for a four-story addition to its plant, to cost $150,000.

The Washburn-Crosby Company, Minneapolis, will spend $85,000 this spring in remodeling its Humboldt mill. All the necessary changes will be in machinery, and the building will not be enlarged.

The Minneapolis Cold Storage Company has taken out a permit for a cold storage warehouse, to cost $60,000, to be located at 71-79 Island Avenue, Minneapolis.

The Sixty-two Fourteen Iron Company, Duluth, Minn., has been incorporated with a capital of $25,000 by Leo A. Ball, Anna M. Ball and F. M. McKay.

The Carter-Phelps Mfg. Company, Keokuk, Iowa, has been formed with a capital of $250,000 to operate a wood-working plant. W. H. Carter and O. E. Phelps are the organizers.

The Des Moines Steel Company, Des Moines, Iowa, has been incorporated with a capital of $10,000 by J. E. VanLiew and John L. Gillespie to do bridge work and general steel fabricating.

The Kansas City Paper House, Kansas City, Mo., will erect a seven-story and basement fireproof building to cost about $120,000.

The Illinois Central Railroad has awarded contract for the extension of its machine shops at Waterloo, Iowa, which will about double their capacity. New equipment will be installed.

Contract for the new buildings for the Standard Oil Company at Wichita, Kan., to cost $100,000, will be let in Chicago this month, and construction will be started early in the spring.

Milwaukee

MILWAUKEE, WIS., Feb. 14, 1916.

The prospective extension of capacity by another large machine-tool interest in the Milwaukee district is announced. Two weeks ago the Kearney & Trecker Company began a large works addition. Now the Kempsmith Mfg. Company has increased its capital to provide for larger production facilities. Tool builders report an increasing demand from domestic sources, and while they are still working on orders for export, are now able to give attention to American purchasers and with larger capacity soon available believe they will be able to fill all requirements with the least possible delay. The ony disquieting feature is the growing shortage of raw materials. So long as purchasers are eager to pay increased prices for finished products, the higher cost of materials is accepted without much complaint.

Manitowoc, Wis., has recommended purchase of new electrical equipment for the recently combined waterworks pumping station and electric lighting plant in a building for which ground has just been broken, which will include one 750-kw. turbo-generator and one 500-kw. generator. H. Pitz is city engineer.

The Mars Mfg. Company, Birnamwood, Wis., has been incorporated with a capital stock of $100,000 by L. A. Jiranek, A. A. Kriewaldt and William Beversdorf.

The Ajax Auto Parts Company, Racine, Wis., has been incorporated by T. C. Hegner, Owen McKivitt and J. J. Lochowitz to manufacture automobile parts, equipment, accessories, supplies, etc. The capital stock is $5,000.

The Dicke Motor Car Company, Manitowoc, Wis., is establishing a branch garage and repair shop in the former Hemacheck machine shop at Two Rivers, Wis., which will be operated as the Two Rivers Automobile Company. Walter Whitney is manager.

The LaCrosse Rubber Mills Company, LaCrosse, Wis., will erect two brick, steel and concrete additions, plans for which are being drawn by V. L. Page, consulting engineer, 613 Whitman Street, Rockford, Ill. One will be four stories, 60 x 200 ft., and the other two stories, 40 x 120 ft. A. P. Funk is general manager.

The Kempsmith Mfg. Company, milling machines, Milwaukee, Wis., has increased its capital stock from $200,000 to $250,000. It is contemplating an increase of its facilities by additions to the works, according to Paul Thomas, secretary and treasurer, but is not ready to divulge the exact nature of the extension. In common with other machine-tool builders of the country, this company has been experiencing the busiest period in its existence.

Bids close Feb. 18 for the general contract for a packing house and cold storage plant, to cost $125,000, for the Inter-County Co-operative Packing Company, New Richmond, Wis. It will be of brick and mill construction, 60 x 120 ft., three stories. Gardner & Lindberg, 140 South Dearborn Street, Chicago, are consulting engineers. William T. Doer is secretary.

Robert Christian, Burnett, Wis., has purchased a site at Madison and Center streets, Beaver Dam, Wis., and will erect a two-story garage, 64 x 80 ft., including a machine shop.

The Conway Company, Milwaukee, has been organized by the interests owning the Conway Veneered Door & Mantle Company, 2019 St. Paul Avenue, Milwaukee, with a capital stock of $125,000. The incorporators are William F. Crosby, Wilson J. Conway and George D. Gohl.

John J. Feit will erect a garage and repair shop on Monroe Street, near Church Street, Stevens Point, Wis.

Arno A. Ewald, who has been conducting a machine shop at Oakfield, Wis., has incorporated under the style of the Ewald Works. The capital stock is $20,000 and the incorporators are Arno A. Ewald, Frank E. Willard, Frank L. Cowles and Watson E. Bristol.

George Kippenhan, Kewaskum, Wis., has sold his machine shop and garage to William Schaub, Jr., for $7,500.

The Four Wheel Tractor Company, Clintonville, Wis., has been incorporated with a capital stock of $125,000 by John Kalmes, Charles Topp, Levi C. Larson, F. M. Hyde, Charles F. Folkman, and A. B. Mayhew. Mr. Kalmes is vice-president of the Four Wheel Drive Automobile Company, Clintonville, which has just increased its capital stock from $250,000 to $500,000.

The John C. Nichols Mfg. Company, Janesville, Wis., is increasing its capital stock from $50,000 to $75,000. It will move to its new plant at Sheboygan some time next June.

The Vesper Iron Works, Vesper, Wis., has been incorporated with a capital stock of $10,000 by C. R. Goldsworthy, Louis Greb and H. H. Wabers.

The Simmons Mfg. Company, Kenosha, Wis., will begin at once the erection of a tube mill 100 x 400 ft., as an addition to its present operations.

The Charles H. Besly Company, Beloit, Wis., is adding two stories to its recently completed shop.

The J. I. Case Threshing Machine Company, Racine, Wis., manufacturer of engines, threshing machinery and automobiles, is preparing to erect a one-story addition to its plant at Lincoln, Neb., and to remodel its present five-story factory at a cost of $17,000. The addition, which will take the place of the present frame wing, will be of brick, steel and concrete, 30 x 112 ft. C. D. Wood is the Lincoln branch manager.

Cleveland

CLEVELAND, OHIO, Feb. 14, 1916.

With the crowding of plants to capacity the tendency of the machine-tool demand in this market is for tools for early delivery, very few of which are to be had. Because of delayed deliveries manufacturers generally have anticipated their future requirements with orders for machine tools for delivery some months ahead. Business is well scattered, although the demand from steel, automobile and rubber plants is especially active and inquiries range from one to a dozen machines. While lathes are in better demand than other machine tools the call for planing machines is heavier than it has been recently. A Detroit automobile builder placed an order for fourteen planing machines with a Cleveland machinery house during the week. Wood-working machinery, which has been dull for a long time, has become fairly active, as well as all lines of general machinery.

The demand for sugar-making machinery from American beet sugar makers and Cuba is heavy and two Cleveland manufacturers of this machinery are filled with domestic work for several months, and for this reason are not going after foreign orders. The activity in sugar-making machinery is to some extent attributed to the high prevailing prices, but largely to tariff legislation on sugar. After the present tariff was imposed with the intention of putting sugar on the free list May 1, 1916, American beet sugar makers stopped extension work and some shut down their plants. As a result there was practically no new construction in this line for two years. Conditions have improved with the high sugar prices brought on by the war, and following the announcement from Washington a few weeks ago that the duty would probably stay on sugar indefinitely, a heavy demand for sugar-making machinery has sprung up for the large existing plants and for new ones. The Kilby Mfg. Company, Cleveland, Ohio, is filled with orders for sugar-making machinery for six months. The Dyer Company has a number of beet sugar plants under construction, as follows: A 500-ton plant at West Jordan, Utah; a 1000-ton plant at Spanish Fork, Utah, and a 500-ton plant at Box, Utah, for the Utah-Idaho Sugar Company; a 500-ton plant at Grant's Pass, Ore., for the Oregon-Utah Sugar Company, and a 500-ton plant at Lovell, Wyo., for the Great Western Sugar Company. The new contracts for sugar-making plants being placed are rush contracts which make it necessary for the builders to secure the steel required in their construction from warehouse stocks.

The Kilby Mfg. Company, Cleveland, Ohio, placed contracts for an erecting shop 45 x 167 ft. A 15-ton crane will be installed.

An additional unit will be erected to the Toledo Factories Building, Toledo, Ohio. This building was erected to provide modern manufacturing facilities for small industrial companies and the entire present floor space has been occupied for some time.

The West Tool & Machine Company has opened a shop on Sylvania Avenue, Toledo, Ohio. H. S. Rundquist is manager.

The Toledo Speed Wrench & Tool Company has been incorporated with a capital stock of $75,000, consisting of $65,000 common and $10,000 preferred stock. It plans to manufacture a quickly adjustable wrench, also other tools, machinery and mechanical specialties. It will not build a factory, but will lease floor space in Toledo, Ohio, probably about 6000 sq. ft. of floor space. Plans call for an output of from 5000 to 10,000 wrenches a week. It is in the market for milling machines, drill presses, lathes, punch presses,

double disk and regular grinding machines, polishing jacks, screw machines, shaping machines, hardening furnaces, pulleys, shafting, belting, etc. John S. O'Connell, formerly of Jersey City, N. J., is president and general manager; Charles D. Wilson, Toledo, Ohio, is vice-president; John W. Raab, 5 Berkeley Building, Toledo, is secretary, and Carl J. Lindecker is treasurer.

The American Grave Vault Company, Galion, Ohio, will enlarge its plant by the erection of a two-story building, 75 x 100 ft.

Indianapolis

INDIANAPOLIS, IND., Feb. 14, 1916.

The Indianapolis Mfg. Company, Indianapolis, has been incorporated with $10,000 capital stock by Horace W. Nordyke, John E. and Grace Norris, to manufacture veneer, etc.

The United Chemical Company, Indianapolis, has been incorporated with $25,000 capital stock to manufacture metal containers for vaporizing of chemicals. The directors are Fred C. Smith, E. F. Jones and H. W. Taylor.

The Studebaker Corporation, New York City, will put into effect, March 1, a 50-hr. schedule at its South Bend, Ind., plant. The pay of the men employed will be the same as for the previous schedule of 55-hr. a week. Piece rates and hour rates of wages will be increased 10 per cent.

The Evansville Veneer Company's sawmill and drying plant, Evansville, Ind., was destroyed by fire Feb. 7 with a loss of $40,000.

The Howard Shipyard Company, Jeffersonville, Ind., is planning an extension of its plant.

The International Iron & Steel Company, Evansville, Ind., will build a new planing mill to take the place of the one recently destroyed by fire.

The International Ordnance & Engineering Corporation, Anderson, Ind., has been incorporated with $100,000 capital stock to manufacture ammunition. The directors are Robert J. Walker, Clarence R. Berkshire and Raymond Stull.

The Heaton Engine Company, Indianapolis, Ind., has been incorporated with a capital of $20,000 by Otis Heaton, T. H. Johnston and A. M. Burke.

The Edwards Valve & Mfg. Company, East Chicago, Ind., will erect a one-story addition to its plant, 40 ft. square.

The Wabash Cabinet Company, Wabash, Ind., will build further additions to its plant, including one three-story building, 72 x 105 ft. New machinery will be installed and equipped with electric drive.

Cincinnati

CINCINNATI, OHIO, Feb. 14, 1916.

Reports from several machine-tool builders indicate that business is dragging. The expected renewal of export contracts has not yet developed to any extent, although the demand for machines from this source is by no means at an end. Railroad buying is conspicuous by its absence, and as far as can be ascertained no lists are out.

Second-hand machinery dealers report some improvement, with small tools in better demand. Manufacturers of portable electric drilling machines are also making optimistic reports.

Labor troubles developed in a local machine-tool plant last week, but indications are for an early settlement and a resumption of activities with the usual full force of workmen. At Hamilton, Ohio, a large foundry that has been badly handicapped for the past three months has adjusted its difficulties and will operate at full capacity. No recognition of the moulders' union was made.

The C. W. Cullen Machine Company, Cincinnati, has been formed to deal in new and second-hand machine tools. Offices have been opened in the Pickering Building.

The Factory Power Company, Oakley-Cincinnati, has increased its capital stock from $200,000 to $300,000 and will increase the size of its power plant.

The Joseph Joseph & Brothers Company, Cincinnati, scrap merchant, has increased its capital stock from $400,000 to $2,000,000. It recently purchased the Railway Supply Mfg. Company, Cincinnati, and will transfer the plant to Harrison Avenue, the location of the scrap yard.

The M. L. Andrew Company, Colerain Avenue and Alabama Street, Cincinnati, manufacturer of special machinery, will build a brick addition to its plant, 30 x 30 ft., two stories.

The C. C. Fouts Company, Middletown, Ohio, is reported to have plans under way for enlarging its plant to manufacture a newly patented metal flume.

The Dayton Spark Plug Company, Dayton, Ohio, has been incorporated with $50,000 capital stock by I. Warner, C. I. Weaver, and others. Nothing is yet known as to manufacturing plans.

The Domestic Engineering Company, Dayton, Ohio, has been incorporated with $800,000 capital stock to manufacture small electric lighting outfits. It is closely identified with the Dayton Engineering Laboratories Company. The incorporators are E. A. Deeds, R. H. Grant and R. D. Funkhouser.

The Gem City Machine Company, Springfield, Ohio, expects to start moving into its new plant some time before March 1.

The Shields Pattern Works, Columbus, Ohio, is adding to its manufacturing equipment.

The Hall-Bochert Dress Form Company, maker of metal adjustable dress forms, will consolidate its four plants, located at different points, at Columbus, Ohio. Considerable extra special machinery will be required. Its offices are at 250 West Twenty-seventh Street, New York.

The McIntyre Mfg. Company, Columbus, Ohio, is adding to its equipment for the manufacture of a light farm tractor, with which it has been experimenting for two years.

The Central South

LOUISVILLE, KY., Feb. 14, 1916.

Inquiries and specifications for machinery are coming out in increasing numbers and forging requirements are unusually extensive. Ice machinery is dull. It is evident that Kentucky will largely increase its normal hemp acreage this year and tools needed are in greater demand. Lighting, water and ice plants are projected in numerous places.

The United Gas & Electric Company, New Albany, Ind., is reported to be considering electrification of its waterworks pumping station, now steam operated. Chester P. Wilson, Indianapolis, is president.

Contracts will be let shortly for construction of the elevator of the Southern Elevator Company, Louisville. It will be of reinforced concrete and cost about $75,000. W. A. Thomson & Co., Louisville, are promoting the project.

The American Metallic Packing Company, Lexington, Ky., is in the market for a 250-hp., cross-tube, Babcock & Wilcox boiler, large and small lathes, and two large planing machines, all second-hand.

The Paducah Ice Company, Paducah, Ky., will enlarge its plant at a cost of $60,000.

The Glasgow Electric Light & Ice Company, Glasgow, Ky., has increased its capital from $50,000 to $75,000 and will make improvements to its plant.

The Paducah Marble Works, 216 North Third Street, Paducah, Ky., is in the market for a 20 to 40-hp. stationary gasoline engine and attachments and will install marble-working machinery. W. D. Stuart is president and J. E. Williamson, vice-president and general manager.

Plans are being considered by the Nicholasville Water Company, Nicholasville, Ky., to enlarge its plant.

The Caldwell Chemical Company, Evansville, Ind., which will build a chemical and dyestuffs plant at Spottsville, Ky., on the Green River, has contracts from the French Government for $460,000 of picric acid, while the Russian Government is also seeking a contract for 15,000 bbl. of the same acid.

The factory of the Seymour Canning Company at Rockford, Ind., was destroyed by fire with a loss of $19,000. It will probably be rebuilt.

C. G. Steve and Mark Watkins are incorporators of the London Motor Car Company, with $5,000 capital, and will operate a garage.

The Barbourville Water Works Company, Barbourville, Ky., is in the market for a gas engine of from 50 to 60 hp.

Hoby & Read will build a garage at Scottsville, Ky.

The John G. Duncan Company, 308 West Jackson Avenue, Knoxville, Tenn., is asking for dealers' prices on a 28 to 36-in. drill press, a 1000-hp. Corliss or steam turbine engine, and for jobbers' prices on an 8¼ x 10 double-cylinder, double-drum American Hoist & Derrick Company hoisting engine, all second-hand and in good condition.

The Hiwassee Light & Power Company, with $5,000 capital, has been organized at Charleston, Tenn., and will supply Charleston and Calhoun with electricity.

E. M. Copeland, W. T. Spurrier, R. T. Hankins, and others, have incorporated the Livingston Heading Company, Livingston, Tenn., with $10,000 capital, and will equip and operate a mill.

The International Electric Company, 656 Madison Avenue, Memphis, Tenn., has been organized and will manufacture electric signs. S. R. Corbitt is president and T. M. Upshaw, secretary-treasurer.

Birmingham

BIRMINGHAM, ALA., Feb. 14, 1916.

"Trade is very satisfactory," remarked the sales manager of the leading wholesale house. The demand for hydroelectric equipment, especially generators, is really excellent. Woodworking machinery is on the active list and there is nothing to complain of in the demand from the mines. Everything indicates quite an active spring. Lathes continue to be almost impossible to secure. Local builders engaged in producing lathes are making them for export. We cannot get in on them.

C. H. Turner & Co., Pensacola, Fla., have been awarded contract for building the laboratory and storehouse of the Newport Rosin & Turpentine Company. There will be five structures, to cost about $250,000. J. A. Wetzel, Mobile, Ala., is the architect.

The Peninsular Iron Works, Lakeland, Fla., recently incorporated, will manufacture mining, irrigating and packing house machinery, boilers, tanks and structural steel work, and will do a general line of machine shop and foundry work.

St. Louis

ST. LOUIS, MO., Feb. 14, 1916.

Machine-tool activities continue at high tide, but dealers report that customers are becoming accustomed to the need for time in delivery and are therefore more inclined to place orders for future delivery. The market generally, so far as supplies of equipment are concerned, is easing up somewhat from its tense condition, but there is still much to be desired, from the viewpoint of purchasers, in the matter of delivery. In consequence of the continued difficulty there is little disposition to put out lists, but rather to make quiet investigation and individual machine purchases. Second-hand tools are in as active request as ever at good prices. Investment funds are easier than they have been, with new enterprises looking better, though still cautious about commitment. Collections are very good. Money rates are easy.

The St. Louis Refractories Company, Times Building, St. Louis, Mo., has been incorporated with a capital stock of $200,000 by C. J. Crawford, R. E. Laidley, J. A. Dewes, and others, and will equip for the reduction of clay and manganese products. Grain magnetite will be one of the specialties for which equipment will be first installed.

The St. Louis Independent Packing Company, St. Louis, Mo., will erect an addition to its plant to cost $100,000.

The Chevrolet Motor Company, St. Louis, Mo., will build an addition, to cost $100,000, to its plant for the manufacture of car bodies. Russell E. Gardner is president.

The Simmons Saddlery Company, St. Louis, Mo., an adjunct of the Simmons Hardware Company, has leased additional space which it will equip for saddlery manufacture.

The Wegner Electric Company, St. Louis, Mo., is in the market for equipment for an addition, 90 x 125 ft., three stories, now being built, to increase its output of electrical machinery.

The Carterville Sheet Metal Company, Carterville, Mo., has been incorporated with a capital stock of $12,000 by F. C. Wallover, L. R. Reynolds and John Boyd, and will equip to manufacture sheet-metal products.

The Striffler Ice & Coal Company, Springfield, Ill., has bought the Rock Springs Ice & Stone Company's plant at Kansas City, Mo., and will install a 2000-ton ice-making and storage plant. The R. M. McCandlish Engineering Company, Kansas City, Mo., is the engineer in charge.

The Marionville Ice & Cold Storage Company, Marionville, Mo., has been organized with a capital stock of $40,000 by local capitalists and will equip an ice-making and a cold storage plant.

The Chillicothe Gun Stock Mfg. Company, Chillicothe, Mo., will install one 8-ft. bandsaw, fifteen small bandsaws, power equipment and other machinery. Additional machinery will be bought later.

The Farm Engineering Company, Sand Springs, Okla., has started construction of the first unit of its plant, which will be 75 x 150 ft. and is to be completed next April. Its purchasing department, located at Oshkosh, Wis., is in the market for machine tools for early delivery, especially lathes, gear hobbing machines and boring mills, all individually motor-driven.

The American Steel Company, East St. Louis, Ill., will increase its plant capacity and will be in the market for equipment when building plans are completed.

The Commercial Acid Company, East St. Louis, Ill., will equip an addition requiring about $10,000 worth of machinery.

Swift & Co., East St. Louis, Ill., will make an addition to their packing plant, requiring about $7,000 worth of machinery.

The Arkansas Light & Power Company, Arkadelphia, Ark., will install new electrical equipment, including generating machinery of 525 kw. capacity at its Mariana plant. C. C. McGill is engineer in charge.

The Springfield Ice & Refrigerating Company, Springfield, Mo., will build an addition to its storage plant to cost about $125,000.

The bill has been passed by the House of Representatives which provides that $75,000 be spent under the direction of the State Board of Public Affairs for the construction and equipment of a factory for manufacturing twine at the penitentiary at McAlester, Okla.

Fire destroyed the general shops of the Midland Valley Railroad at Muskogee, Okla.

The Mid-Co Gasoline Company, Tulsa, Okla., has been incorporated with a capital stock of $250,000 by M. M. Travis, A. E. Aronson and L. E. Z. Aronson, and will equip a plant for the manufacture of gasoline, etc.

The Midland Valley Railroad, Muskogee, Okla., of which C. Kaighn is chief engineer, will rebuild its machine shops, burned with a loss of $45,000.

The Sandringham Company, Patterson Building, Oklahoma City, Okla., is in the market for one 40 to 50-hp. electric motor, centrifugal sand and dredge pump, etc.

James T. Simpson, Mound Bayou, Miss., is in the market for a gasoline-engine-operated isolated electric generating plant.

The Southern Pacific Company will equip additional freight-handling facilities at New Orleans, La.

The Federal Fruit & Cold Storage Company, James L. Wright, president, Whitney-Central Bank Building, New Orleans, La., will equip a large ice and refrigerating plant, with electrically-operated loading and unloading devices. The cold storage plant will be a large six-story building. Probably $500,000 will be the ultimate investment.

Texas

AUSTIN, TEX., Feb. 12, 1916.

An improvement of the machinery and tool trade is to be noted this week. The spring trade is opening most satisfactorily. The demand for mill machinery shows a good increase.

Work on the new San Antonio shops and yards of the International & Great Northern Railroad will commence at an early date. The plans will include shops equipped with machinery and tools, a roundhouse with accommodations for eighteen locomotives, brass foundry, wood-working plant, blacksmith shops, car repair sheds, and sand depot. The construction will be of steel, concrete and glass, and it is estimated the total cost will be between $350,000 and $400,000.

The Pacific Coast

SEATTLE, WASH., Feb. 8, 1916.

The blizzard and snowstorm which swept over the Pacific Northwest for almost a week completely paralyzed business. In Seattle the past week, business in practically every line was suspended. Industrial plants made half-hearted attempts to remain open, but, with less than half of their regular employees at hand, in most instances, the plants were closed at noon. Shingle mills and sawmills suffered severe damage through collapse of roofs from accumulated snow. More than three feet of snow fell within the week and the broad roofs were unable to withstand the weight. The main building of the O-K Shingle Company, Everett, collapsed with heavy damage to the machinery; the lumber shed of the Eclipse mill in that city was also crushed. In Mukilteo, the roof over the planer mill of the plant of the Crown Lumber Company fell, crushing the planing machinery, and causing the close-down of the entire plant. Machinery and hardware houses report that every snow-handling appliance, including plows, shovels, etc., has been sold out. Stocks on hand for years have been disposed of.

Practically every mill, shingle and lumber, and every logging camp in Washington and Oregon, is closed down at present, with no prospects of reopening for at least a month or six weeks. Mills in the inland are covered with from 5 ft. to 10 ft. of snow, and logging operations are completely suspended. At the time of the storm, the mills in Puget Sound and Grays Harbor country were seriously handicapped by lack of logs, and this further delay in logging will mean practically a cessation of activities for several weeks.

The Willamette Iron & Steel Works, Portland, Ore., reports that it recently had under construction forty logging engines, one of which goes to Manila, one to Australia, an-

other to Alaska, eight to British Columbia logging mills, and the other twenty-nine are for the nearby states.

W. R. Phillips, president of the Bankers Trust Company, Tacoma, Wash., is authority for the statement that a large Eastern chemical corporation plans the construction of a chemical plant in Tacoma to cost $500,000.

The Mountain Timber Company, Kalama, Wash., will rebuild its sawmill, destroyed some time ago with a loss of $400,000. John Patterson is sales manager.

Charles R. Crawford, Valdez, Alaska, contractor and builder, has purchased a site in that city, on which he plans to establish a wood-working factory.

The Hedlund Box & Shingle Company, Spokane, has been incorporated for $100,000 by D. C., D. A. and F. A. Hedlund. It is understood the company plans a shingle mill, with box factory in connection.

The Tacoma Can Company, Tacoma, Wash., will construct new quarters at 1903 Jefferson Street, and purchase equipment and machinery costing $10,000.

The Treadwell Company, Skagway, Alaska, announces that it will expend about $4,000,000 within the next two years in developing and equipping its Alaska-Juneau mine near Skagway.

The Pacific Boiler Company, manufacturer of return tubular steam and hot-water boilers, Seattle, will move its plant to Tacoma, Wash., where it will be in full operation within three months. It is being reorganized, with a capital stock of $55,000, and additional capital will be invested. C. T. Nelson is president.

According to report, an iron and steel rolling mill plant will be constructed near Portland, Ore., by the Pacific Coast Steel Company, San Francisco.

The Merchants Central Heating Company, Seattle, has begun work on construction of its central heating steam plant, to furnish steam heat for 23,000,000 cu. ft. of space in office buildings. Fourteen steam boilers will be installed, each 35 ft. high, to generate 700 hp. each.

The Colfax Iron Works, Colfax, Wash., has recently purchased a site for a new iron works, and will start work in the early spring on new buildings.

The Crowe Water Engine Company, North Yakima, Wash., has been incorporated for $1,000,000 by F. C. Crowe and J. E. Forman.

The Warrenton Clay Company, Portland, Ore., announces that plans for its clay-working plant to be erected near Warrenton at a cost of $75,000 will be ready for figures in about 30 days. Plans are being prepared by the Beijsbeek Engineering Company, Portland.

The General Machinery Company, Spokane, Wash., plans to erect a factory and warehouse on East Riverside Avenue, Spokane, in the spring. It will cost about $10,000 and will be for the manufacture of mine accessories, such as cages, ore cars, flotation tanks, etc. The company will also erect cranes and establish a storage yard. E. J. Simons is manager.

The Ferris Auto Repair Works, 101 North Broadway, Seattle, has changed its name to the Ferris Motor & Machine Company. It will enlarge its activities and do a general machine and repair business.

The plant of the Spokane Ornamental Iron Works, Spokane, which was destroyed by fire recently, with a loss of $25,000, will be rebuilt on an enlarged scale. A. H. C. Trepte is president.

A. D. Fish, Portland, Ore., has opened a machinery assembling plant at 605 Washington Street.

The Lindstrom-Berg Cabinet Works Company, Tacoma, Wash., has changed its name to C. W. Lindstrom Cabinet Works, Inc.

The Distributor Plate Casting Machine Company, Seattle, has been incorporated for $200,000 by Martin Leinweber and Heine T. Roller.

The John Wood Iron Works, Portland, of which, C. E. Mack is manager, reports that it is building in its Portland shops an asbestos shreading or fiberizing machine designed by Herman Mango, Newberg, Ore.

The Southern Pacific Railroad is preparing to add eleven stalls to its roundhouse at Sparks, Nev., and will install a heating plant to heat the entire shop.

Fairbanks, Morse & Co., whose Portland store was recently burned, have taken temporary quarters at Second and Stark streets.

The York Electric Steel Company, Portland, was burned out Feb. 4, with an estimated loss of $30,000. Leonard Schad is manager.

The Seattle Construction & Drydock Company, Seattle, has recently taken contracts for three 7500-ton steamers for foreign interests, and has other important marine business pending. Plans are under consideration for the extension of the shipyards.

The Pacific Coast Steel Company, San Francisco, is fitting up branch offices in the Alaska Building, Seattle, Wash.

The A. L. Maeder Company, Portland, steel merchant, has opened a warehouse on the Alaska Dock, Seattle.

The Grays Harbor Commercial Company, Cosmopolis, Wash., will add to its mill a 750-hp. Allis-Chalmers steam turbine generator, a complete motor equipment, and a fire pump.

The Oregon Brass Works, Portland, has ordered a lot of special machinery for the manufacture of hydraulic specialties.

J. B. Barnes & Co., 175 Stewart Street, San Francisco, will erect a shipbuilding plant at Alameda, Cal., to cost $500,000.

Canada

TORONTO, Feb. 14, 1916.

The Imperial Munitions Board, Ottawa, Ont., has just received an order for 800,000 18-lb. shells from the British Ministry of Munitions. This is the first large order to come to Canada since the present Imperial Munitions Board succeeded the former Shell Committee, the board's energies having been directed chiefly toward hastening deliveries on orders placed some time ago. It is probable that the new orders will be allotted in the form of renewals to firms which are already engaged in the manufacture of shells. The Canadian munitions industry has developed a greater capacity for turning out 18-lb. shrapnel than for the manufacture of any other and is well able to take care of the order just received.

The Imperial Munitions Board, Ottawa, Ont., will build a large plant at Verdun, Montreal, for the manufacture of loading fuses, etc. J. W. Flavelle, Ottawa, Ont., is chairman of the board.

The following information has been sent by the Government of Australia to the Department of Trade and Commerce of Canada. Plans and specifications are now in the hands of the Trade and Commerce Department at Ottawa, Ont.: Tenders will be received addressed to the Director of Navy Contracts, Melbourne, Australia, up to May 1, 1916, for the supply of the following equipment required by the Commonwealth Naval Dockyard, Cockatoo Island, Sydney, N. S. W.: Three 50-ton overhead traveling cranes, one 25-ton overhead traveling crane, two 5-ton overhead traveling cranes, one 10-ton revolving cantilever crane, two 5-ton traveling portal jib cranes, two 7½-ton jib cranes, one 5-ton jib crane, two 15-ton hydraulic cranes, one 6-ton hydraulic crane, one 6-ton hydraulic wall crane, two 3-ton hydraulic wall cranes, two electric passenger elevators, two electric goods elevators, one 2½-ton gage locomotive with crane attached, one 2½-ton tone gage locomotive without crane attached, three electrically-driven air compressors, 1500 cu. ft., one 15-ton hydraulic winch, one 5-ton hydraulic winch, nine 10-ton hydraulic capstans, two 5-ton hydraulic capstans, one bar shearing machine, one double-ended horizontal punching machine, one 10-ton overhead traveling crane for shipyard fitting shop.

The Gutta Percha & Rubber Company, Ltd., 47 Yonge Street, Toronto, will at once erect an addition to its factory on West Lodge Avenue.

The Ford Motor Company will build an assembling plant at Calgary, Alberta, to cost $200,000. It has secured a site at Eighth Street West and Eleventh Avenue. The initial building will be 130 x 200 ft., four stories.

St. Mary's, Ont., contemplates the erection of an auxiliary pumping plant to cost $8,000. Gasoline engines may be used. Thomas M. Clark is clerk.

The Steel Company of Canada will build an addition to its Montreal plant to cost $24,000.

The Excelsior Machine Company, Ltd., Saskatoon, Sask., has been incorporated with a capital stock of $10,000 to manufacture machinery, tools, etc.

The Drydock & Engineering Company, North Vancouver, B. C., will build a drydock and shipbuilding plant at Vancouver to cost $5,500,000. The Pacific Dredging Company has received the contract for erecting the buildings.

The Dunlop Tire & Rubber Company, Booth Avenue, Toronto, will commence at once on the erection of an addition to its factory.

W. F. Croaker of Newfoundland is interested in a company that is contemplating the erection of a shipbuilding plant at Catalina, Newfoundland, to cost $1,000,000.

Collingwood, Ont., is in the market for machinery for its waterworks plant, including pumping machinery, comprising one motor-driven unit of 800 gal. per minute capacity,

Hugh A. Currie is chairman. Chipman & Power, Mail Building, Toronto, are the engineers.

The Williams Mfg. Company, St. James Avenue, Montreal, will build a foundry at its plant.

The Kettle Valley Railroad, Penticton, N. B., will build an addition to its machine shop.

The Maxwell Motor Company, Detroit, Mich., has purchased a site at Windsor, Ont., and will commence work shortly on a factory to cost $45,000. The E. E. Sheldon Construction Company has received the contract for the erection of the building.

The Universal Stove & Furniture Company, 77 Sandwich Street East, Windsor, Ont., will build a factory for the manufacture of stoves, furnaces, etc.

The Board of Control, Montreal, will erect a pumphouse and install a pumping plant for the Notre Dame de Grace sewer. D. McLeod, City Hall, Montreal, is the engineer in charge.

The Metal Drawing Company, Race Street, St. Catharines, Ont., has commenced work on the construction of a plant there. A. E. Nicholson, Queen Street, is the architect.

The Gill Motor Company, Ltd., Montreal, has been incorporated with a capital stock of $100,000 by G. M. Smyth, T. M. Gill, J. B. Poisson, and others, to manufacture automobiles, motors, etc.

La Compagnie d'Energie Electrique de Saint Come, St. Come, Que., has been incorporated with a capital stock of $15,000 by J. A. Poloquin, F. P. Lamontagne, G. Rheaume, and others, to build and operate electric plants to generate light, heat, power, etc.

The American Can Company, Vancouver, B. C., announces that plans for an addition to its new factory on Railway Street have been completed, and bids for construction will be received soon. The structure will be two stories, 125 x 145 ft., of brick and mill construction, and will cost $70,000.

The Perkins Glue Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $40,000 by James G. B. Perkins, Thomas H. Crompton, Hugh J. McKenna, and others, to manufacture glue. It will shortly establish a factory at Hamilton.

The St. Clair Oil Refining Company, Ltd., Toronto, has been incorporated with a capital stock of $250,000 by Thomas H. Hamilton, Toronto; William R. Mather, Stirling, Ont.; John E. Stanton, Ragland, Ont., and others, to refine petroleum, etc.

The Beamsville Basket & Veneer Company, Ltd., Beamsville, Ont., has been incorporated with a capital stock of $40,000 by Samuel G. Near, A. W. Reid, Thomas Nodwell, and others.

John B. Smith & Sons, Ltd., Strachan Avenue, Toronto, is in the market for a 25 or 30-ton saddle tank locomotive.

John Pirson, Stevensville, Ont., is in the market for machinery for tight barrels, drum saw and a 36-in. stave joiner.

The Machine & Stamping Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Kenneth F. MacKenzie, 48 King Street West; Arthur L. Reid, 61 Rhodes Avenue; William H. Cook, and others, to manufacture metals, etc.

The Canadian Rock Drill Company, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by Walter J. Boland, 2 Toronto Street, John F. Boland, and others, to manufacture drills, tools, etc.

The Ontario Machine Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by James Chisholm, William G. Smart, Thomas B. McQuesten, and others, all of Hamilton, Ont., to manufacture dairy machinery, shells, tools, farm implements, boilers, etc.

The Advance Engineering Company, Ltd., Toronto, has been incorporated with a capital stock of $20,000 by Eugene R. Angers, Howard S. Ross, Henry M. Gardner, and others, all of Montreal, to manufacture machinery and to build and operate power plants, etc.

The Pembroke Iron Works, Ltd., Pembroke, Ont., has been incorporated with a capital stock of $100,000, by Edward A. Dunlop, John F. Munro, William F. Fenton, and others, to manufacture machinery, shells, war munitions, etc.

Government Purchases

WASHINGTON, D. C., Feb. 14, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9309, for twelve water-tube boilers, for Boston; schedule 9298, for three 4000-lb. pneumatic motor-driven hoists; schedule 9291, for seven mandrel presses, with pedestals; schedule 9310, for sixteen hoisting winches.

NEW TRADE PUBLICATIONS

Belt Dressings.—Joseph Dixon Crucible Company, Jersey City, N. J. Pamphlet entitled "The Proper Care of Belts." Points out the advantages of using a belt dressing regularly to preserve the belts and secure the maximum amount of service from them. In addition to covering the company's line of belt dressings, considerable useful information is given on the subject of the results of abusing belts, how they should be run and rules for calculating the proper length of belt for carrying a given load and the speed of pulleys. Mention is also made of some of the company's other products.

Portable Channel Iron Punch.—W. A. Whitney Mfg. Company, Rockford, Ill. Circular. Concerned with a portable punch for cutting a hole ¼ in. in diameter in the center of a 4-in. channel section having 1½-in. flanges. A brief description of the construction of the punch is given, while an engraving of the tool is relied upon to tell the principal part of the story. An illustrated description of the punch appeared in THE IRON AGE, Sept. 30, 1915.

Grinding and Polishing Machinery and Countershafts.—Builders Iron Foundry, Providence, R. I. Catalog. Mentions a line of grinding and polishing machinery and countershafts operated by the pulling of a chain. For the most part a pair of pages is given to each machine, an engraving being presented on one with a brief description and table of specifications on the facing one. Mention is also made of a belt shifting mechanism operating on the pull principle and a line of countershaft pulleys. A complete index to the catalog and the code words used for ordering is included.

Counting Machines.—Durant Mfg. Company, Milwaukee, Wis. Catalog. Illustrations and descriptive matter explaining the operation of a line of counting machines, which are marketed under the name of the Productimeter, for use in all kinds of industries. In addition to the engravings of the Productimeters themselves, views are presented of the instruments in use on machines of various kinds such as stamping and printing presses, lathes and addressing, can wiping and wood working machinery. Mention is made of an instrument equipped with an alarm bell for use on machines where runs of a definite number are made, and the tests to which the instruments are subjected before leaving the factory.

Centrifugal Pumps.—Wheeler Condenser & Engineering Company, Carteret, N. J. Bulletin No. 108-A. Describes a line of centrifugal pumps for condenser circulation, irrigation, drainage, dry dock, general mill and power plant service, for motor, engine or belt drive for heads ranging from 0 to 300 ft. Special emphasis is laid upon the casting and machining of the pump parts and a short description of foundry methods is included. Among the pumps shown are a combined motor and geared turbine-driven unit, a complete surface condenser auxiliary having a circulating pump directly connected to the turbo air and condensate pump driven from a common turbine. Mention is also made of a line of vertical shaft pumps.

Telephone Holders and Accessories.—K. & B. Company, 25 North Seventh Street, Philadelphia, Pa. Pamphlet. Describes a line of holders of various types for enabling the telephone instrument to be readily swung out of the way and as easily brought into position for answering a call. Among the other accessories listed are a call counter, memorandum pads and indexes of the numbers used most frequently.

Optical Istruments.—Bausch & Lomb Optical Company, Rochester, N. Y. Pamphlet. Mentions a line of optical instruments for the inspecting and testing of materials such as ores and metals, rock, concrete, wood, leather, fabrics, paints and varnishes, oils, drugs, chemicals, etc. The instruments listed include microscopes of various types, photomicrographic and illuminating apparatus and devices for measuring the color and viscosity of oils and other liquids. In connection with each of the instruments an engraving is presented with a brief description of the construction and use of the apparatus and a table of the sizes that can be furnished. Mention is also made of accessories, such as eye pieces, magnifiers, objectives, focusing and condensing glasses, specimen holders, etc.

Tramrail Systems, Trolleys and Electric Hoists.—Brown Hoisting Machinery Company, Cleveland, Ohio. Catalog D 1916. Deals with a line of tramrail systems for use in industrial plants of various types and the trolleys and electric hoists employed in connection with them. A number of views of actual installations are presented to supplement the description of the tramrail systems and this arrangement is also followed for the electric hoists. The trolleys are illustrated and briefly described, and tables giving the various sizes of each style that can be furnished are included.